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DIFFERENCES AND SIMILARITIES BETWEEN CULTURE AND CAPTURE OPERATIONS IN INLAND FISHERIES

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In a recent article Kesteven (1954) defined fishery biology as "the special application of biological methods to the investigation of living aquatic resources for the purpose of obtaining information as to how these resources might be exploited by mankind, or to how they might be affected by such exploitation."

After the fish have been landed many technological and economical questions will require the attention of those actually engaged in the industry or attached to it in an advisory position. But before that stage the main questions are: how can more fish be grown in inland waters and how can more fish be caught in perpetuity from such waters.

Inland fishery operations are usually divided into culture and capture operations and in view of this customary distinction, the fore-going approach to fishery biology may be regarded as a dual one.

In the following few lines an attempt will be made to define briefly the differences and similarities of these two branches of inland fishery biology, as well as the underlying biological principles. Let us compare a fish pond, properly managed, stocked and after some time drained and cropped, with a lake, marsh or other open body of water regularly exploited by some form of inland fishery. In the case of the highest form of pond culture we have a man-made pond, situated in a carefully selected spot, with fertile soil and water, stocked with an optimal number of fish of a type best suited to utilize the natural food produced in the pond, or fed with the kind of artificial fodder most economically procured and utilised by the fish. No extraneous species are allowed to enter; noxious insects, birds and other enemies of the fish are constantly barred and diseases are successfully combatted. After a period, proven to be the optimal one, all fish are gathered and sold.

The other extreme is the lowest form of capture operations, where a natural lake with a mixed population of totally unknown magnitude, age composition and natural mortality is being fished, by arbitrary methods, at an arbitrary rate. It is completely unknown whether the stock present is the most suitable one in respect of the natural food production, both from the quantitative and the qualitative points of view; nothing has been done to improve the production of natural food or the suitability of the environment for the innate behaviour of the fish and whether a situation of over-fishing or under-fishing does exist is also completely unknown.

The picture of these two extremes is by no means a theoretical one only, as both situations – or very near approximations to them – might be seen in the immediate vicinity of one another. For instance, in Indonesia, according to 1955 statistics, the open waters of Sumatra and Borneo produced an average quantity of 13-16 kg./ha./year while the

freshwater ponds of Java produced 2,000 kg./ha./year. Between these two extremes the differences are considerable, but they are linked by numerous intermediate stages.

In most fish ponds, production of the level of that in the freshwater ponds of Java is not reached and a good deal of practical experience has to be gained and scientifically planned research has to be carried out in order to attain this level. On the other hand, numerous examples can be cited – both in the Indo-Pacific area and elsewhere – where a fishery in open waters has developed far above the low stage described above. In many American lakes the entire natural stock of fish was destroyed by rotenone and replaced by a more suitable one of carefully designed specific composition and magnitude. Numerous improvements of the habitat were effected, such as eradication of noxious weeds, planting of desired vegetation and provision of shade and shelter for the fish. The rate of fishing was strictly controlled so as to yield optimal results, on a basis of comparison between the yield of previous years when different rates and methods has been used.

In such cases the methods developed in sea fisheries for assessing the permanent, optimal rate of fishing can be used in the most strict way, and even sometimes be improved, owing to the relatively small size of the object, as was proven, for example, by Ricker's (1944) work on natural mortality.

In pond culture as well as in fishing in open waters the biologist will recognize a form of population management, despite the fact that in the pond the entire population is cropped at the end of the period of cultivation, while in natural waters a stock composed of different year-classes is cropped more or less regularly all the time. Modern theories of rational fishing in the ocean, as developed by Beverton and Holt (in press), as well as rational management of large inland lakes (Ricker, 1945 and Westenberg, 1955) take the growth of the different year classes as a base and try to balance the increment due to growth against the loss due to natural and fishing mortalities and thus to arrive at the most suitable combinations of fishing rates and mesh-sizes, out of which one may be selected on economical and technical grounds. This theory can be applied in large inland lakes, where it is often easier than in the ocean to establish the existing rates of fishing and natural mortality, but where the mutual influence of different species of fish in close contact and competing for food or devouring one another, may introduce new difficulties.

In our sample pond, recruitment is non-existent, natural mortality is nil or very low, and fishing mortality is always a hundred per cent. There will always be losses, in rearing ponds often negligible and in fry ponds often fairly large, but as short periods of growth only are involved in our area, such losses are never really as considerable in ponds as in the sea. In Europe where large fish is wanted for human consumption and the average temperature is low it may take some years to grow fish of the required size, but this period is sub-divided in several periods of one season. In a pond the growth factor is the only important one, dictated by the natural – be it artificially enhanced by the use of fertilizers– food production of the pond, whether or not increased by artificial feeding, and also by the stocking rate. According to Walter (1934) a definite optimal stocking rate can be distinguished owing to the fact that, in an understocked pond not all available food is utilized and although individual growth is maximal, total production is low as a result of the small number of fish. In an overstocked pond an unwarranted fraction of food is used in maintenance metabolism of the animals and not enough food is left for growth.

In tropical regions a special type of open waters is found in which the inland fisheries resemble the situation in ponds. In many large areas with a very pronounced difference between the wet and the dry seasons, lakes and dead river arms show an enormous difference in areas actually under water in either season. In extreme cases, shallow lakes are completely dry during part of the year and others are reduced to narrow creeks or small pools. Many waters of this type are almost completely emptied of all fish each year, in this respect resembling a pond. For introduction of a new stock, the fishery here relies on connection with permanent rivers or other lakes from where spawners will swim in at the beginning of next rainy season. The newly inundated shores offer an ideal spawning ground. Although some subsistence fishing will be carried out throughout the year this flooding period is one of relative rest for the fish because intensive fishing will be postponed until the water subsides and the fish start to swim back to the rivers through narrow pathways where they can easily be caught.

Fish of an age of one season will form the bulk of such populations, as the author (Vaas and Schuurman, 1949) found in an analysis 940 *Osteochilus hasselti*, "nilem", taken from such an area in East Java.

If natural recruitment and repopulation of the area is well guaranteed by proper connections with open waters where the stock is not exterminated, a 100% fishing will be an advantage here. The composition of the stock, in terms of different species, vegetable-feeders as well as predators, still differs from that of a properly stocked pond, and it involves interspecific competition and elongation of the food-chains.

If the vegetable-feeders are acceptable to the consumer and do not offer special difficulties to the industry—in the case where some process of preservation is involved—and if the difference in price between the vegetarian species and the carnivorous species is not too large, it may be advisable to encourage intensive fishing of the predators as in this way more fish flesh can be produced.

Analogous to the optimal stocking rate in a pond is the optimal fishing rate in the sea and in large inland waters, in so far as the ultimate result is concerned.

However, in the pond all fish are cropped at the same time and in the sea the choice of the mesh-size dictates the size limit of fish that will be caught. As a total removal of the fish at the theoretical stage of maximal total weight of the year-class is obviously impossible here, we have to establish a certain mesh-size which will capture some year-classes too early and some others too late. For those fish caught too early we have curbed the possibility of additional growth and for those caught too late we have increased the possibility of death from natural causes. Maximal yield will be attained when the losses caused by curbed growth combined with those derived from natural mortality are at a minimum. So here, as well as in the pond, the basic biological process is the growth of the fish.

The ultimate objective then is the application both in pond culture and in the exploitation of natural waters of systems of management which will result in optimum production, i.e. the greatest production consistent with a continuity. Basic to such a management system is an adequate knowledge of the biology of the fish.

REFERENCES

Beverton, R.J.H. and S.J. Holt (in press). On the Dynamics, Exploitation and Conservation of Fish Populations. *Fish. Invest., Min. Agr. and Fish., London.*, Ser. 11.

Kesteven, G.L. (1954). The Scope of Fishery Biology. *Proc. and Techn. Papers No. 2, Gen. Fish. Coun. Medit.*, : 262.

Ricker, W.E. (1944). Further Notes on Fishing Mortality and Effort. *Copeia : 23.*

„ (1945). A Method of Estimating Minimum Size Limits for Obtaining Maximum Yields. *Copeia : 84.*

Vaas, K.F. and J.J. Schuurman (1949). On the Ecology and Fisheries of Some Javanese Freshwaters. *Comm. Gen. Agr. Res. St., Buitenzorg, No. 97.*

Walter, E. (1934) Grundlagen der allgemeine fischereiliche Produktionslehre. *Handb. der Binnenfisch, Mitteleurop., 2B., Stuttgart.*

Westenberg, J. (1955). Die Entwicklung der Fischereitheorie. *Zeit. Fisch. 4 (N.F.) : 297.*

Electric Signals by Fish

Certain fish send out weak electrical signals, and apparently use these signals to gain information about their surroundings. The first such case was reported by Dr. H. W. Lissmann, of the Department of Zoology, Cambridge University, in 1951. The one which he first observed was an African freshwater fish, *Gymnarchus niloticus*, which is roughly one foot in length. It sends out continuous signals at a rate between 258 and 318 pulses a second. The rate is affected by the temperature of the water but not by the degree of activity shown by the fish. The greatest observed strength of the signals was about 30 millivolts.

Dr. Lissmann found that the fish responded by their behaviour to changes in the electric field which they set up about them, and also to pulses similar to their own. Soon after he found that signals of the same general type but differing in details were produced by two other species of fish. He pointed out that the production of these weak signals was of interest in relation to the origin of organs of electric discharge, notably in the electric eel, which gives a high enough voltage to be of obvious value to the fish.

Later the electric eel itself was found by Dr. R. D. Keynes to produce smaller pulses which it appeared to use, like those other fish, to obtain information about its surroundings. These pulses, normally at the rate of about one a second and some few mill volts in strength, are sent out by the eel only when it is moving. Their rate is increased sometimes to as much as 20 a second, when the eel is showing interest in any object nearby. The case of the electric eel seems to prove that pulses sent out at comparatively long intervals can be of value to the fish.

GENERAL NEWS

Oceanographical Investigations of the China and Java Seas

UNESCO has offered to sponsor a study of the southeast Asian waters with particular reference to "(a) the circulation under the influence of the monsoon currents and (b) nutrients and plankton." The China Sea and the Java Sea are included in the plan. UNESCO plans in this respect to obtain the co-operation of the merchant ships plying the area. Negotiations are in progress for obtaining the services of Dr. K. Wyrtki of the Laboratory of Marine Research in Djakarta for the execution of the plan.

The southeast Asian waters are divided into the deep sea in the eastern part and the shallow waters of the Sunda Shelf. While the deep sea has been explored by a number of oceanographic expeditions, and detailed information on its oceanography is available, the present knowledge of the waters of the Sunda Shelf is very limited, in spite of the fact that they are of importance in navigation and will play in the future a significant role in fisheries development.

Seasonally changing monsoon currents develop in the China Sea and the Java Sea. The northern part of the China Sea is a deep basin, but its upper layers are part of the general circulation including the Java Sea. Both seas form a unit which is open only to the northeast and southeast except for two narrow channels, the Malacca and Sunda Strait.

The few available studies of these waters, however, may conveniently form the basis of further investigations. It is known that along the line China Sea–Java Sea, the axis of which runs in the direction of the monsoon, considerable water movements take place, showing an annual cycle of great constancy. Nothing is known about its minor fluctuations, and about the water masses which are exchanged, nor about the distribution of nutrients and their annual variations which are closely correlated with the distribution of the plankton and the stocks of fishes. These are questions which have not only a scientific interest but also an important meaning for the fisheries.

In studies of the circulation in the monsoon currents, current measurements, measurements of the transport, hydrographic observations, sea level records and meteorological observations will be made. Direct current measurements and hydrographic observations are to be made by research ships at regular intervals at fixed stations, if possible 4 times a year at the time of full development of the monsoons. The regular sampling of surface salinity and temperature observations, being currently made by marine research organizations in the neighbouring countries, will be extended. If possible, one or more anchored current meters will be used.

The transport will be determined by measuring the potential of existing telephone cables. For measurements of the sea level a net-work of gauges is already in use; this will be increased by additional stations. Meteorological observations are available from the meteorological institutes in the region.

The distribution and the annual cycle of the nutrients and of the plankton will be investigated simultaneously with hydrographical observations by the research vessels. The plankton samples will be analysed not

only qualitatively, but also quantitatively in order to obtain information on the productivity of these waters.

Along the route Hong Kong–Singapore and Singapore–Djakarta, a plankton recorder will be used at regular intervals of about 2 months. This can be done from a merchant ship navigating regularly along this route. The obtained planktonological materials are to be distributed to the participating institutes to guarantee continuous and quick analyses. Methods used will be uniform and the number of samples limited according to the working capacity of the different participating institutes.

Comprehensive fishery statistics for the period of investigation are also to be obtained from fishery organizations in the region for a comparison of actual fish production with the productivity of the waters. Such statistics will include species composition of the catch as well as its seasonal and zonal variations.

These activities are primarily planned for a period of three years during which it might be possible to gain sufficient knowledge of the oceanic circulation and simultaneously of the distribution of nutrients and plankton and their annual variations in the region.

The Laboratory of Marine Research in Djakarta may undertake the overall supervision of the plan and the survey in the Java Sea and in the southern part of the China Sea upto about 3° N. The research vessel m.v. *Samudera* of this Laboratory is able to make all necessary hydrographical and chemical investigations during its normal 4 cruises every year. Current measurements can also be made by the ship with a modern electric current metre.

For the central and northern China Sea another vessel may have to be found as the m.v. *Samudera* is not seaworthy for these waters during the northeast monsoon.

The sampling of information on fisheries is one of the items for the attention of the Indo-Pacific Fisheries Council (IPFC) and may be, depending on the arrangement with UNESCO in this respect, carried out in collaboration with all fishery organizations in this region *(UNESCO Newsletter No. 3, April 1957, p. 5)*.

Special Committee on Oceanic Research

At the International Conference of Oceanographers held in Gothenburg from 15-18 January 1957, a Special Committee was established to conduct joint international oceanographic research.

The new organization will be directly interested in oceanic research from all scientific points of view, including geological, geographical, biological, and physical aspects. During the discussions it was emphasized that the organization will need scientists combining the necessary scientific qualifications with a great amount of initiative. The members should also be able to raise the the money needed to carry through the programme.

An American scientist, Dr. R. Revelle, has been named president of the new organization, and the vice presidents are Dr. M.M. Hill, England, and Professor L. Zenkevitj, Soviet Union. On 3-14 September 1957, the oceanographers will again convene (in Toronto) in conjunction with a meeting of the International Union for Geodesy and Physics.

According to Professor Zenkevitj, the leader of the Soviet delegation, Soviet oceanographers have made extensive preparations

for their participation in the geophysical year. Some 15 vessels are being equipped and will serve as a permanent fleet for research in the Atlantic, Pacific, and Indian Oceans and in the north and south polar regions. The Soviets are very much interested in carrying out biological research and Professor Zenkevitj recommended that expert biologists be attached to the expenditions to study plankton samples and bird and mammal life at sea. He stressed, however, that he was not referring to the cultivation of algae and plankton, but rather to increasing the yield of food products obtained from the sea, mainly by intensified fishing. There are enormous areas, particularly in the southern hemisphere, where there is no fishing at all

A number of the delegates to the Conference met on two additional days at the request of an American delegate, Dr. Roger Revelle, head of the Scripp's Institute of Oceanography in California, who convened the meeting at the request of the United Nations for a discussion of oceanographic and marine biological viewpoints on radioactive waste in oceans with special emphasis on the influence of radioactive particles on commercial fishing.

Special attention was also given by the conference to research work during the geophysical year when the Indian Ocean will be studied most thoroughly.

Midwater Trawl Improved

New improvements have been made in the midwater trawl, adapted for the herring fishery off British Columbia, by the Fisheries Research Board of Canada under the Industrial Development Service of the Department of Fisheries.

Two new advantages are claimed for the modified gear. Developments in design permit the net to be operated from single-gear trawlers, putting it within the economic range of relatively small-type vessels. A new type of otter board permits trawling both in midwater and on the bottom without damage to the gear.

The Fisheries Research Board said that recent fishing, from the chartered boat, *Phyllis Carlyle*, has proved successful in taking herring from midwater depths down to within two fathoms of the sea floor. The officer in charge of fishing operations on the *Phyllis Carlyle* said tests were hampered by an unusual delay in the appearance of herring in the Strait of Georgia in 1956, but that sufficient evidence had been gathered to show that the net can be operated efficiently.

The new midwater trawl is a four-sided net, having an opening of 30 feet at its front end. A combination of aluminum alloy trawl plane floats and newly developed hydroplane floats keeps the net from touching bottom, thus preventing damage from fouling on the sea floor. The new otter doors are also made of aluminum and can operate efficiently both in midwater and for bottom trawling, according to *Trade News* (December 1956) of the Department of Fisheries of Canada.

Telecommunicating Depth Finder for Midwater Trawl

A new type of depth finder has been developed in West Germany to determine the movement of midwater trawl nets. The device uses sound signals to indicate the depth at which the midwater net moves. Experts claim it to be an improvement over depth finders using frequency modulation,

since it makes easier the adjustment of midwater trawl nets to the depth at which fish swarms have been located by echo-sounders.

The telecommunicating depth finder consists of a conventional pressure meter attached to the ground rope of the trawl net and measuring the depth position of the net. These measurements are electrically transformed into sound signals and transmitted to the fishing vessel. The German apparatus uses groups of intermittent sound signals for various depths, as it was found to be too difficult to produce Morse-code signals for this purpose. The oscillator therefore emits uniform signals of a steady frequency of 15 kc. with a speed of about three signals a second. Every period of 10 seconds from 1 to 10 signals are emitted to indicate the depth measured by the pressure meter attached to the trawl net. For example 2 signals per 10 seconds may indicate that the net is moving at a depth of about 15 to 20 feet, 3 signals at 20 to 25 feet, 4 signals at 25 to 30 feet, etc: When a depth of 60 feet has been reached, the series of signals start again with one per ten seconds. No difficulties were experienced in repeating the series of signals because the depth at which the trawl net moves can easily be determined within a tolerance of 60 feet.

The use of intermittent signals rather than frequency modulation seems to have definite advantages. The signals fortunately are, for all practical purposes, not affected by disturbances caused by the ship's propellor. This difficulty was reported to be one of the main obstacles in the development of the frequency-modulation method for commercial use. Recent tests conducted with the new device on board the research vessel *Anton Dohrn* showed an excellent reception of signals emitted from a trawl net towed with 375 fathoms of line at a depth of 450 feet.

Codes for Better Quality Fish

Evidence of the increasing attention being given to the hygienic handling of fish is provided by new Fresh Fish Quality Improvement Rules adopted by trawlers and primary wholesalers in New England, U. S. A.

These Rules and Standard procedures for Fresh Fish Quality Improvement applicable to New England trawlers have been prepared by members of the industry, the Technology Division of the National Fisheries Institute, and the United Stated Fish and Wildlife Service. The rules are for use wholly on a voluntary basis.

Handling of Fish

a. Fish must be gutted thoroughly, leaving no part of the gut (livers, etc.) to start spoilage.

b. All sizable fish must be gutted, winter and summer.

c. Gutted fish must be washed thoroughly.

d. Water in washing box must be changed frequently—do not depend on the overflow.

e. Fish must be put down and out of the weather as quickly as possible.

f. Fish coming out of the hold must be sorted with care to cut down on number of culls.

Icing

a. Ice bed in pen must be at least six inches thick.

b. Jagged edges in crushed ice must be pounded out (the bottom fish carry the weight).

c. At least three inches of space must be left between fish, pen boards, and hull so that when you build up, the ice will enter this area for proper keeping.

d. All layers of fish in pens must be gauged to the size of the variety so that all fish get the benefit of ice.

e. Never neglect to shelve fish. Protect your investment in labor of catching and handling by relieving pressure.

f. Plenty of ice must be used at all times. *Ice is cheaper than fish.* Protect against breakdown, bad weather, and accident or sickness.

Sanitation

a. The hold must be dried out and painted thoroughly at least once a year.

b. The hold must be washed completely after the discharge of each trip. After thorough washing, sprinkle the entire area with salt or any other similar agent.

c. Pen boards must be washed and scrub bed immediately after they come out of the hold. Keep pen boards painted Replace worn or beat-up boards immediately.

d. Working tools, which come in contact with fish, must be kept clean and free of rust.

e. Culls must be handled quickly when discharging trip. Do not throw them back on deck. Place them immediately in iced container on the deck.

f. Facilities provided for personal cleanliness must be used.

REMEMBER ALWAYS THAT YOU ARE HANDLING FOOD.

Removal of Fish From Boats

a. Conveyances (carts, boxes, trucks, etc.) must be in a clean and sanitary condition before receiving fish.

b. Conveyances must never be overloaded.

c. Covers must be provided for use on all conveyances and covers must be used immediately after the conveyance is loaded regardless of location.

d. Fish stored in conveyances, or stored in area awaiting handling, must be iced at all times.

e. Fish that have been iced awaiting handling must be inspected periodically for ice renewal when needed.

Plant Procedure

a. Forks and hooks used in direct handling of fish must be abolished wherever possible.

b. Containers used for shipment of fresh fish must be clean and new.

c. The practice of returning packages (barrels, boxes, etc.) for credit or re-use must be abolished entirely except in the case of tight containers where fish are floated.

d. Fish (fillets, etc.) that are awaiting handling (to and at freezer) must be racked to relieve pressure and, if possible, use racks that require no additional handling.

e. Fillets (etc.) in a fresh condition, that are to be transferred from one place to another for any reason whatsoever, must be carried in containers provided for the purpose. Each container to be covered and iced regardless of destination.

Sanitation

a. Carts, boxes, and conveyances of any kind must be washed thoroughly, immediately after they become empty of fish.

b. Plant and equipment must be subject to constant washing down when plant (or store) is in operation.

c. Responsibility for plant cleanliness must be specifically assigned to a person (or persons).

d. Exterminators (individuals or firms) must be employed for the control of rodents, vermin, flies, etc.

e. Fish operations (filleting, cutting, etc.) practised in the open must be abolished. Proper cover and facilities for cleanliness must be available.

f. Clothing of all personnel must be kept in a clean condition consistent with the requirements demanded in the handling of food.

g. Smoking in filleting rooms and wrapping rooms—on lines, tables or benches used for processing—must be abolished.

Bacteria in Fish Boxes

According to Dr. R. Spencer of the Humber Laboratory, Food Investigation Organization, Department of Scientific and Industrial Research, United Kingdom, the number of bacteria per square inch of the inside of wooden fish boxes are:

New unused box	70 million
New boxes, used once, sampled before celaning	20 million
Old boxes, sampled before cleaning	450 million
New boxes, used once, after cleaning by hosing with water	2 million
Old boxes after cleaning by hosing with water	175 million
Old boxes after hosing with water and steaming for one hour	260 thousand

With old boxes, quite strong disinfectants were necessary to give reasonable cleaning, and with an old well-used box having a surface contamination of hundreds of millions of bacteria per square inch, even a redcution of 99.9 per cent in the number of bacteria would still leave hundreds of thousands of bacteria per square inch of the box. The general conclusion was that heavily contaminated wooden surfaces were almost impossible to clean satisfactorily.

Turning to methods of cleaning dirty well-used fish boxes, Dr. Spencer gave these details:

Method of Cleaning	*% reduction of bacteria*
Hosing with water alone	40.0
Scrubbing with water alone	64.0
Hosing with hypochlorite solution containing 100 p.p.m. free chlorine	60.0
Hosing with hypochlorite solution containing 1,000 p.p.m. free chlorine	97.5
Hosing with 0.1 per cent solution of a quarternaty ammonium compound	54.0
Hosing with 0.5 per cent solution of a quarternary ammonium compound	99.8
Scrubbing with a non-ionic detergent	48.0
Scrubbing with 0.1 per cent solution of a quarternary ammonium compound	95.0

Experiments in comparing the degree of contamination and of cleaning obtainable with resin-coated and uncoated wooden boxes showed that the resin-coated boxes became less heavily soiled and were much more easily cleaned.

Recent study of a mechanized fish filleting line in Canada showed that fillets picked ud bacteria of the order of thousands to the square inch from all surfaces with which they might come in contact, such as parts of conveyor belts and cutting boards.

One way in which contamination of fillets could be reduced was by "in-plant chlorination". This consisted of chlorinating the water supply of the plant to a final concentration of about 5 parts per million of chlorine. This had no deleterious effect on the fish, but was sufficient to kill the bacteria present. This mildly disinfectant water was then used copiously for washing the whole fish, filleting benches, conveyor belts and the fillets, with beneficial results (*Fisheries Newsletter, 16* (5), 1957, p. 21).

South African Fish Flour

After four years of research South African scientists claim to have perfected a process by which fish flour is now made completely tasteless and odourless.

It is being supplied to bakers by the South African Department of Nutrition for use in fortified brown bread. All bread in the Union is subsidized, but to encourage the consumption of this bread, which has been named "Bremer bread" in honour of Karl Bremer, a former Minister of Health, an additional subsidy is given. This enables a 2 lb. loaf to be sold at 7d. as against 9½d. for a white loaf. Since the introduction of Bremer bread the demand for brown bread has increased by 12 per cent.

The National Nutritional Research Institute of South Africa points out that the flour when added to the protein already in the bread has the effect of increasing the biological value of the existing protein content.

The loaf contains about two per cent fish flour and, when the scheme is fully operative, 5,000 tons a year will be required.

The raw material for the flour consists of commercial fish meal or press-cake prepared from small fish. The process involves the following steps:

a. The crude meal is extracted with a solvent mixture consisting of 90% of industrial ethyl alcohol of 96% strength and 10% ethyl acetate.

b. Five or more extractions are carried out, until the drained solvent appears colourless. Each extraction takes 20 minutes at the boiling point of the solvent, approximately 180° F. The ratio of solvent to meal is about 2.5:1 by weight.

c. Each extraction is followed by a 1:1 wash with clean solvent.

d. After extraction the flour is completely freed from all traces of solvent by drying in hot air, or by vacuum (with or without the aid of "steam stripping").

The fish flour produced by this process has a light brown colour and is free from the effects of heating. It is neutral and, in particular, is absolutely free from all fishy or other foreign odours.

The material obtained by acetone extraction of the final product (after acid hydrolysis) does not exceed 0.7% by weight and the moisture content of the flour varies between 2 and 3%

The biological value of the protein in the raw material is not impaired by this process, and the resultant fish flour is therefore considered eminently suitable for the enrichment of bread and maize meal.

Workshop on Population Dynamics and the Selectivity of Fishing Gear

The Workshop organized jointly by the International Commission for North Atlantic Fisheries (ICNAF), International Council for Exploration of the Sea (ICES) and the Food and Agriculture Organization took place in Estoril, near Lisbon, Portugal from 27 May to 3 June 1957. It was

attended by research workers from ICNAF and ICES member countries, and members of FAO and ICNAF Secretariats. One research worker from Turkey also participated. Approximately 100 papers prepared for the workshop by workers of the participating countries and organizations were discussed. These papers concerned three major topics: population dynamics, the measurement of effort, and the selectivity of fishing gear.

Arising out of the discussions, attention of the participating governments and organizations was drawn to the need for uniformity in terminology, techniques of research and interpretation of data as well as a close co-operation among the research workers engaged in the field. The workshop also desired to explore the possibilities of publishing a journal concerned in the main with studies on fish population dynamics. The participating governments and organizations are being circularized in these respects for comments.

INPFC Meeting held in Tokyo March 1957

International North Pacific Fisheries Commission (INPFC) meetings in Tokyo during March 1957 were attended by a number of Canadian, American, and Japanese delegates. The commission was formed by a tripartite Treaty between Canada, Japan, and the United States in 1953 for the conservation of stocks of fish on the high seas of the north Pacific Ocean. The Treaty eovers an ocean area of 32 million square miles. Approximately one-third of the world's supply of fish is taken in the area by the signatory nations and other bordering nations, including China and the U.S.S.R.

During 1955 and 1956 the Commission undertook a research programme of record size in the area extending northward from the latitude of San Francisco to near the Bering Strait at the entrance to the Arctic Ocean and across to the Asiatic shores. Twenty ocean-going research vessels occupied stations throughout this vast and stormy expanse in 1956.

The principal subject of research at present is a determination of whether or not salmon from Asian streams mingle in the sea with salmon from the streams of North America. If the Commission finds that salmon from the two continents mix on common feeding grounds in mid-ocean, it must draw dividing lines based on scientific research which will most equitably divide the stocks.

The Tokyo meetings were divided into two series. During the week beginning on 11 March, representatives of the three countries discussed the status of the salmon, herring, and halibut fisheries along the Pacific coast of Alaska, British Columbia, and the United States. Japan has agreed to abstain from fishing these stocks, on the condition that the United States and Canada maintain a maximum sustainable annual harvest from them, coupled with a full research programme and adequate enforcement of conservation measures. The committee studied reports dealing with this complex and important question and advised the Commission on the need for further studies. Beginning in 1958 the Commission must decide annually if stocks of fish protected under the abstention clause of the Treaty continue to qualify, or if the abstention should be lifted.

During the third week of March, the Commission's Committee on Biology and Research met to plan and co-ordinate details of the 1957 research programme. Oceanographic research vessels connected with this programme have departed for

north Pacific waters. They will be followed by vessels studying the distribution of salmon throughout their range and later by other vessels engaged in the mid-ocean tagging of salmon, for later recovery in their home. areas

Institute of Seaweed Research changes *modus operandi.*

The Institute of Seaweed Research at Inveresk Gate, Musselburg has recently changed its *modus operandi.* The main responsibilities of the Institute are now to support fundamental seaweed research at the universities, to operate an information service, particularly for the use of industry and to give technical assistance and advice to those interested in seaweed utilization. Previously the Institute used to conduct research at its own laboratories based at Inveresk.

Since 1944, the Institute of Seaweed Research had been engaged in elucidating many of the scientific problems associated with the marine algae and their utilization. This work which has stimulated great interest in practically every maritime country in the world, has aided the development in the United kingdom of a new industry based upon seaweed, and now using annually more than 40,000 tons of a crop which, until recently, was looked upon as useless. The sale value of products of this new industry at present exceeds one million pounds per annum.

Mr. E. Booth, in charge of the new operations, is responsible to the Institute of Seaweed Research Board which has been re-constituted in line with the change in emphasis of its work.

The Government of the United Kingdom have agreed to the sale of the laboratory of the Institute at Inveresk Gate, Musselburg, to a new organization called Arthur de Little Institute. The new Institute has been sponsored under the joint auspices of the Arthur de Little Organization of Cambridge, Massachusetts, U.S.A., and a number of individuals in the United Kingdom. The new Institute will primarily undertake fundamental scientific investigations, while the parent organization in the U.S.A. has been and is still working on widely varied problems of both basic and applied research brought to the Organization by the U.S.A. industry and Government.

By agreement, the work on seaweed research which is being continued under the aegis of the Institute of Seaweed Research, is still based at the Inveresk laboratories. (Press release by Arthur D. Little Research Institute and Institute of Seaweed Research, February 1957).

New Fishery Film

A new film designed to tell the story of handling of fish from catching to serving, was released by U.S. Fish and Wildlife Service in mid-April. Named "Fresh Out of the Water", it is a 16 mm. film, in sound and color, and runs 14 minutes.

Beginning with an underwater sequence, the film first shows the catching of fish, emphasizing cleanliness of fishing boats and extreme care which is given fish from the moment of catching. It then moves onto a brief but comprehensive picture of what takes place before the fish reach the consumer—icing, freezing, filleting, canning, and other processing, transporting and marketing. Then it shows two steps very important after the product is in the consumers' hands--proper preparation of food and, finally, serving it in an attractive manner.

NEWS FROM MEMBER GOVERNMENTS

AUSTRALIA

Droplining Found Superior to Longlining

In the recent line fishing survey by CSIRO Division of Fisheries and Oceanography, off the southeast slope of Australia, droplining was found superior to conventional longlining. Captain R. J. Downie, Master of the CSIRO fiishing research vessel *Derwent Hunter*, developed in 1954 the technique known as droplining. The gear consists of a wire line carrying 25 hooks lowered in the same manner as a hand line without releasing it from the winch. The first 25 f. is fitted with lead ball-stops as in the conventional longline and to this portion only are the hooks attached. A 70 lb. sinker is used and the line fished vertically with the sinker just clear of the bottom. In addition to the line, an echo-sounder to record depth and a revolution counter to measure the amount of line paid out are also used.

When echo-sounder recordings indicate the presence of fish, the line is paid out. The 'bites' of the fish are easily detected by placing a hand on the wire line and, having allowed the fish to bite for 5-10 minutes, the line is hauled with its catch of fish.

From catch records of the above CSIRO line fishing survey, the superiority of the total catch rate of droplining is significantly established, being 15.6 fish per 100 hooks as against 10.8 per 100 hooks obtained from longlining over comparable periods. This represents an increase of almost 45 % in the rate of catch.

Apart from its greater efficiency in catching fish, droplining has a number of economic and technical advantages over its longline counterpart. These are concerned mainly with cheapness, mobility and simplicity of operation. (*Fisheries Newsletters*, *16* (5), 1957 7-9 pp.,).

BURMA

Fish Culture in Rice Fields

Experiments are underway for developing fish culture in rice fields. An estimated 15 million acres or 6 million hectares of rice fields are considered suitable for this type of fish culture. .The fields in Lower Burma and Kachin State are flooded during the months of June to October by rain and those in the Dry Zone during July to August by irrigation. About 300,000 acres or 120,000 hectares situated near irrigation tanks can be flooded from July to November.

Ditches, 10' wide by 3 deep, were dug along two sides of 8 plots, measuring approximately 3 hectares. The excavated earth was used to raise the original bunds. One week after rice planting, 1,600 *Tilapia* fingerlings, 3-6 cm. long, were stocked in the ditches. No additional fertilizer or artificial feed was used. After 3 months (August to November 1956) 12 kg. *Tilapia* of 10-15 cm. long, 1,000 *Tilapia* fingerlings, 3-6 cm. long, and 3 kg. snake-heads were harvested. The low harvest is presumed to be due to predation by the snake-heads on the stock of *Tilapia*, and poaching.

A similar experiment is currently underway near the Hlawga Freshwater Research Station. Three plots measuring about 3 hectares have been employed. 400 *Tilapia*, 6-10 cm. long, stocked in August 1956 and 1,000 fingerlings of the same size stocked in December 1956 are in the ditches. Breeding has been observed. Harvesting of the stock has been delayed due to water-retention arrangements.

Marketing and Socio-economics Scheme

The Land and Rural Development Corporation of the Ministry of Agriculture and Forests has introduced a scheme for the improvement of the marketing of fish and socio-economic conditions of the fishermen. During June-September 1956 the Corporation issued, under this Scheme, loans to fishermen amounting to K. 171,000. For the period of June-September 1957 K. 400,000 is earmarked for further loans. The scheme was put into an effect in June 1956 on a small scale at Kadongani and Eya villages, Bogale Township, Pyapon District and is to be extended gradually to other coastal fishing villages.

The scheme provides for:

Organization of inshore fishermen into co-operative societies under the technical guidance and financial control of the Corporation.

Loans directly to the fishermen on a joint security basis (security of property not being required) at 6¼% per annum interest and recoverable by three yearly instalments.

Supply of fishing materials directly to the fishermen at wholesale rates.

Technical advice to fishermen for the improvement of craft and gear, processing methods, transportation and distribution of fish.

The scheme also provides for compulsory marketing of fish products such as dried prawn, dried fish and fish paste, through agents selected by the co-operative societies and approved by the Corporation.

Although a middle-class family in Burma spends for fish and fish products, approximately 30% of its total expediture on food, fish production to Burma is far short of the demand, nor are fish distribution and marketing organized properly. The above Scheme is one of many which aim at increasing fish production in Burma as well as at a proper organization of the industry.

CEYLON

Canadian Fisheries Projcet

The Canadian Colombo Plan Fisheries Project in Ceylon, has been playing an increasingly important role in the development of Ceylon's fisheries.

Canada's total aid for the project, for which $1,000,000 was made available in 1952-53, has been extended to the value of $1,407,000. This is to provide for the construction of a cold storage plant, fish reduction and ancillary pilot plants, and related fishing equipment. To help meet local costs of the fisheries harbour in Mutwal, Colombo, Canada has agreed to supply flour to the extent of $600,000 for which a rupee

counterpart fund equivalent to the Canadian cost will be established. Canada is also supplying laboratory, machine shop, and fishing equipment, including marine diesel engines, a mechanical fish drier, and a pilot fish cannery.

It will be recalled that the purposes of the project are to determine fish population potentials in the coastal waters of Ceylon and the most efficient method of harvesting the tropical seas, also to demonstrate the effectiveness of a moderate degree of mechanization of the fish handling and distribution methods in Ceylon.

Part of the Canadian aid has taken the form of a deep-sea trawler, equipped with a refrigerated fish hold, which has made a valuable contribution to the Island's fish supply. Canadian aid has also provided for the supply of a 500-ton cold storage building for holding fish, and for two multi-purpose fishing vessels complete with gear.

The cold storage plant, the new fishery harbour at Mutwal, a by-product factory, and other ancillary units are nearing completion, and the inland fisheries are being developed. A Canadian consultant on fishermen's co-operatives has completed and reported on a survey of the fishing villages in relation to co-operative development.

Manager for Mutwal Fisheries Project

Under the Colombo Plan, Canada has made available the services of Mr. G.W. Crane to the Ceylon Government for a period of 18 months in the first instance. On his arrival in May 1957, he took over as Manager of the Mutwal Fisheries Services Cold Storage and By-Products Plants. His task will be to develop these services into self-sufficient operating units and complete the training of the "counterpart" Manager.

Mr. Crane succeeds Mr. A.W. Lantz, a fisheries technologist, whose assignment as Director of the Canadian Colombo Plan Fisheries Project at Mutwal terminated in August 1956. Mr. Lantz assisted the Ceylon Government in the initial operation of the various aspects of the fisheries project, but as this work could not be completed during his term, the services of another expert to complete the development of the project were requested.

Mechanized Surf Landing Fishing Boat

A 24-ft. surf landing boat is to be constructed by the Government shortly. The plans for this boat have been prepared by F.A.O. naval architects at Rome and FAO/ETAP expert to Ceylon, Mr. Kvaran. This is the first construction of a surf landing boat in Ceylon and the future of mechanized fishing in Ceylon might depend largely on the results achieved with this boat. It is hoped that the boat will be ready for trials by about November 1958.

Nest-frames to induce Spawning of Giant Gouramy

Introduction of nest-frames in an experimental pond at the Watupitiwela station was successful in inducing Giant Gouramy stocked in the pond to spawn. Six nest-frames were introduced in the pond which was stocked with three pairs of mature Giant Gouramy. Three weeks after the introduction, the fish built a nest in one of the frames and 700 eggs were laid on it.

The eggs were collected and hatched in the laboratory of the Fisheries Department. About 80% of the eggs hatched. The rate of mortality of the young larvae was as high as 20% during the first week.

An extensive programme for the introduction of nest-frames into 7 of the major irrigation tanks, approximately 22,000 acres in area, which are stocked with mature Giant Gouramy, is expected to be launched soon, and private pond-owners are showing a keen interest in the method.

Smoking and Saling of Freshwater Fish

Experiments on smoking, salting and drying of freshwater fish are currently underway at the Fisheries Department Laboratory. Of the various kinds of cured fish produced, smoked *Tilapia* has been well received by the Sinhalese, while salted and/or smoked *Labeo dussumieri* is favoured by the Muslims.

An analysis of the smoked and dried products prepared in the Laboratory gave the following figures:

Species	Moisture	Fat	Salt
	%	%	%
Labeo dussumieri	27.0	20.1	9.6
Etroplus suratensis	32.5	19.0	12.9
Tilapia mossambica	26.0	4.0	11.2

The loss in weight due to the smoking and drying was about 30%.

These experiments are being continued to evolve a product of good keeping quality.

Training in Fishing

The two 45-ft. all-purpose fishing boats presented by Canada in March 1953 have completed the exploratory survey of Ceylon waters and have now commenced work in association with the four training schools. Fishermen making use of the facilities available at the training schools will be taken on board these two boats and trained in new methods of fishing. These fishermen thus trained may take advantage of the loan facilities shortly being made available to purchase new gear or to improve their existing gear to suit the new methods of fishing which they will have learnt.

Loans to Fishermen

A scheme for the issue of loans to individual fishermen for improvements to fishing gear and purchase of new equipment for new methods of fishing, will come into operation shortly. At present loans to the fishing industry are made only through registered co-operative societies. In order to make easier credit facilities available to the fishing industry, it is proposed to issue loans to individual fishermen in addition to the credit now given to co-operative fishing societies. Loans up to Rs. 300 will be available to fishermen with no security other than a personal bond and a conditional transfer of the gear owned by the individual. Loans up to Rs. 3,000 will be available on a bond backed by two sureties and a conditional transfer of the gear owned by the individual. For loans over Rs. 3,000 hypothecation of immovable property will be required.

INDIA

Territorial Waters Limit Established

In a proclamation by the President of India (Territorial Sea Belt), dated 22 March 1956, and published in the *Gazette* of India, the territorial waters of India are established at six nautical miles measured from the appropriate base line.

The proclamation states that due to the lack of uniformity in international practice regarding the extent of the sea belt known as territorial waters of the State, a declaration is necessary to establish the extent of the territorial waters of India.

INDONESIA

General Notes

The Government of Indonesia have intensified their efforts to develop the country's fishery resources. Noteworthy among the various plans for such developments, is a project for sea fisheries at Kota Baru, Kalimantan, which comprises *inter alia*: (a) a plant for manufacturing fish-meal; (b) a fish cannery; (c) establishments for the mechanical drying and salting of fish; (d) plants for manufacturing fishing nets; and (e) a training centre for fishermen.

This project was drawn up by Dinas Perikanan Laut (Sea Fisheries Service, Ministry of Agriculture) and is to be implemented with assistance from the International Co-operation Administration of the U.S.A.

Implementation of the project has already started and the construction of the various buildings and plants is progressing according to schedule. The project is expected to be completed in two to three years.

The efforts of the Inland Fisheries Service are also bearing fruits. An appreciable increase occurred in pond fish production in Kalimantan during the last two years. In these ponds mostly "Sepat Siam" (*Trichogaster pectoralis*) is cultured.

In the Djapara region the population, under the guidance of Inland Fisheries Service of Djawa Tengah, is improving the cultivation of oysters. One kilogramme of oysters at Djapara at present fetches Rp.8, while the average price of sea fish does not exceed Rp.5 per kilogramme.

Exploration of Shrimp Rsources

The Sea Fisheries Service are conducting exploratory trawling for shrimps along the east coast of Kalimantan with the research vessel *Muna*. The operations are being directed by Mr. T.H. Butler (Canada), FAO/ETAP Marine Biologist assigned to Indonesia.

During April this year, 36 tows were made in the region between Balikpapan and Kota Baru, at depths of 5 to 25 meters. The best haul of 100 kg. of good quality shrimps was made in a one hour tow near Tandjung Maroeat, South of Balikpapan at 10 meters depth.

These explorations are being continued and another research vessel *Lollipop* is soon to be commissioned for the purpose.

JAPAN

Japan and Soviet sign 1957 Fisheries Agreement

Signing of a Soviet-Japanese protocol in Tokyo on 7 April fixing Japan's salmon catch this year in the restricted zone in the North Pacific concluded over 50 days of negotiations between the two countries. Present at the signing ceremonies were Agriculture-Forestry Minister, Ichitaro Ide of Japan and First Deputy Fisheries Minister, Aleksei Kutyrev of the Soviet Union.

In a joint communique, issued following the signing ceremony, the most important steps settled were announced as: Total annual salmon catch for Japan in the Sea of Okhotsk in 1957 not to exceed 13,000 metric tons and to be taken by no more than 2 motherships; for the conservation of Red Salmon, fishing to be suspended after 20 July in the waters of the Bering Sea and the North Pac ic north of the 52nd parallel, west of 170° 25' E., and east of the Kamchatka Peninsula. Specific restrictions were also placed on small herring, trawling and other operations using moving fishery tools, as well as the crab catches in certain areas.

The Commission worked out a basic policy for the co-ordination of scientific inquiries into fishery conditions in the restricted zone, and will exchange various statistical data for 1957 and the ensuing years.

Fisheries Exploration in the Tsushima Warm Current

The Government of Japan in co-operation with fisheries research organizations (including universities and laboratories) in the country undertook in 1953 a 5-year comprehensive research programme on the ecology, composition and migration of populations, plankton, spawning, tagging, capture of the young of fish, relation between current and fish-school, etc., of of the so-called 'Tsushima Warm Current'.

'Tsushima Warm Current' is a branch of the Black or Japan Current, which runs up north into the Japan Sea along the north coast of Japan. From ancient times the waters affected by the warm current have been said to have abundant marine resources such as sardine, mackerel, saury, etc. Even now, it cannot be said that the resources in these waters have been fully explored and exploited.

The fisheries in the Japan Sea consist of various small types of fisheries operated within a limit of about 30 miles from the shore. Information on oceanography, biology and the fisheries resources of the offshore waters are not comprehensive, although occasional big catches from these waters have been recorded.

The 5-year research programme is due to be completed this year. The results obtained have been made available to the fishermen from time to time to facilitate their operations. The final report will be published in due course.

Special research work has been developed, as a part of this programme, in order to obtain comprehensive data on the fishing grounds. This work is now being performed by five researchers on a rubber raft (10 meters in length and 5 meters in width) fitted with various research requisites, such as wireless installations, fish finders, oceanographic survey apparatus, etc. The raft drifts in the Tsushima Warm Current for

about two months during which time the five scientists on board make their observations.

Importance of Natural Population Fluctuations in Tuna Fisheries

Natural fluctuations in the tuna populations are of prime importance and fishing has had little permanent effect on the stocks, according to a talk given by the Director, Mr. Hiroshi Nakamura, of the Nankai Regional Fisheries Research Laboratory at the Kanagawa Fisheries Experiment Station on 14 August 1956. This evidently represents a different point of view from the panel discussion held at Misaki, Japan on 23 August 1956, where industry members considered the problems which might be taken up by the Tuna Fishery Investigative Committee recently established by the Japanese Fisheries Agency, and where the gist of the discussion was that lower daily catches of tuna experienced by Japanese fishing vessels in recent years might be an indication of overfishing, and that regulation might be in order some day.

In his discussion, Mr. Nakamura commented regarding the close relationship between currents and the fish fauna and pointed out documented instances of major changes in tuna populations, changes that could not possibly be ascribed to fishing. Mr. Nakamura also dealt with the forecasting of tuna abundance *(Comm. Fish. Rev., February 1957, p. 46)*.

Fisheries Mutual Aid Programme

The Government of Japan established, in the beginning of 1957, a programme for fisheries mutual aid. The programme extends to the 18 prefectures.

There are two types of mutual aid; the one applicable in case of a sharp fall in fish catch, and the other in case of damage to fishing gear.

If a loss, incurred as a result of natural causes reaches the prescribed amount (in case of the proceeds from the catch, 20 % of the estimated cost of production), the balance is paid from the mutual aid fund in proportion to the actual loss incurred.

In assessing the quantity of the anticipated catch, estimates based on the usual quantities purchased by model fishermen's co-operatives are applied. These prices are also adjusted taking into account the fluctuations in the prices of fish.

It will be recalled that a system of insurance for fishing craft and gear has been in operation in Japan for several years. The present programme however is in response to a long standing strong demand from the fishing industry for a mutual insurance system against damage to the fishing gear and sharp falls in fish catches due to natural catastrophes.

KOREA

Netting Industry expanding with UNKRA-Imported Machines

With net-making machines imported by the United Nations Korean Reconstruction Agency (UNKRA) now in operation, Korean fishermen will be able to spend less time in mending old fish nets and more in fishing. The acute shortage of nets, first caused by the intensive war damage suffered in Korean ports, was further aggravated in

the last few years as the fishing fleet was restored and expanded by UNKRA'S programme of aid for the fishing industry.

Under UNKRA projects private firms have been given loans to help them build more boats, and ice plants, canneries, and fish markets have been reconditioned or constructed to handle the catch.

However, net manufacturers, with only 50 per cent of the machinery they needed, were unable to keep up with the revitalized industry. Consequently, fishermen still had to patch and sew to hold together the remnants of their nets, and their catch was limited by the inadequacy of their equipment.

To meet part of the immediate requirements UNKRA brought in 330,287 pounds of trap, shore-drag, gill-nets, purse-seines and shrimp trawls valued at US $ 284,548. This aid was followed by machinery imports to help the net-manufacturing companies step up production to a level consistent with the development of the industry they supply. Under this $ 100,000 programme, eight companies operating in the fishing centers of Chung Moo City, Samchon Po, Pusan, Camchock, Changhang, and Seoul have received and put into operation 36 net-making machines and 10 winders.

PAKISTAN

General Notes

Under a scheme for Fresh Fish Supply in Karachi, the construction of a 10-ton cold storage plant has been completed and another 5-ton plant is nearly complete. A majority of the 22 modern fish stalls, part of the same scheme, widely distributed throughout Karachi are complete. These stalls which will be serviced by the two cold storage plants will be open all day for the sale of fresh fish.

With the on-set of the monsoon, the exploratory fishing vessels of the Central Fisheries Department were laid up. Annual repairs to these vessels are already in progress.

Preliminary to the implementation of fisheries development projects on the Mekran coast, work has started on a scheme to supply fresh water to the important fishing ports on that coast.

Fish Harbour Development

The construction of the fish harbour in Karachi is progressing satisfactorily. The boundary wall has been completed; levelling of ground and construction of roads are nearly 75 % complete; 430 concrete piles to support the pier have been driven and the construction of the Cafe building is 50% complete.

A modern fish harbour is planned for Chittagong, East Pakistan, and a plot of 2.65 acres of land has been acquired in the Chittagong Harbour area. A jetty, a fish marketing building with a 10-ton ice plant and 50-ton cold storage plant attached to it, are to be constructed soon on the plot. Designs for these installations and estimates of cost are being prepared by the Chittagong branch of Pakistan Public Works Department.

Nylon Nets help Fishermen

Nylon yarn supplied to West Pakistan fishermen by the Pakistan Central Fisheries Department for knitting nets has helped to increase their fish catch. The fishermen became aware of the value of nylon netting during World War II when surplus parachute nylon fiber was used in nets. Some excellent hauls by Karachi fishermen have aroused considerable enthusiasm on the part of the fishermen for nylon nets.

With the help of the commodity aid agreement between Pakistan and the United States, officials of the Pakistan Central Fisheries Department distributed US$ 100,000 worth of nylon to the fishermen in 1956. Under the agreement, the United States undertook to supply the necessary foreign exchange for importing consumer goods or industrial raw materials, which included nylon for fishing purposes. Government officials estimate that about 1,000 fishermen have benefited from the sale of nylon. Since the supply was limited, distribution was restricted to the most deserving fishermen.

The fishermen have learnt that while cotton nets last only about six months, nylon nets are good for at least three years. In addition, nylon nets are tougher and can handle bulky catches without breaking. Therefore, nylon netting in spite of the higher cost a square yard is really more economical in the long run.

As provided in the commodity aid agreement, the nylon netting was sold to the fishermen at cost and is payable in long-term instalments. The money realized from the sale of the yarn is to be placed in a special fund to be used for furthering the development programme of Pakistan. *(Pakistan Affairs, 16 September 1956).*

PHILIPPINES

Research in Marine Biology

The activities of Dr. K.F. W. Tiews, FAO/ETAP Marine Biologist, assigned to the Philippines have developed into a research project in which the counterpart assistants are being trained in the biological study of several groups of commercially important marine fish. To make this research programme effective, the Bureau of Fisheries has submitted a project proposal to the Government asking for $ 10,900 from the U.S. International Co-operation Administration (ICA) funds and P. 88,600 as Philippine counterpart fund during the fiscal year 1957.

Over 46 counterpart assistants under training are studying taxonomy, life-history as well as biometrics of Tuna, Anchovies, Roundscad (*Decapterus*), Slipmouth (*Leiognathus* sp.), Shrimps, Lizard fish (*Saurida* sp.), *Nemipterus* sp., and *Rastrelliger* sp. In addition, the salinity, surface temperature, nutrients and plankton contents of the waters in which these fish appear are also being investigated.

Japanese Gear Proves Successful

The Far Eastern Fishing Corporation has successfully demonstrated the effectiveness of trap net fishing (otoshi-ami) in Philippine waters. The Corporation erected two trap nets, using "Kuralon" netting, in the municipal waters of Paluan Bay in the western part of Mindoro Island. An impressive catch consisting mostly of striped tuna, and a small percentage of yellowfin,

was made in March and April this year. Unfortunately, due to a very low demand for tuna as fresh fish, the firm was obliged to transfer the two trap nets to the waters of Palawan where the main bulk of the pelagic species caught are the hasa-hasa (*Rastrelliger* sp.) and the alumahan (*Pneumatophorus* sp.).

Mr. Takehasi Sato, the Japanese fishing technician employed by the Corporation was responsible for the introduction of trap net fishing in the Philippines. He was assisted in the installation of this gear by 12 other Japanese fishing technicians engaged by the Corporation.

Experimental Tuna Processing

Experiments on the processing of tuna for commercial use were recently commenced by the Bureau of Fisheries. Heavy tuna catches by m.v. *David Star Jordan*, operating under guidance of Mr. Tatsuzo Suzuki (Japan), FAO/ETAP Fishery expert, stimulated these experiments. The fish used in the experiments came exclusively from the catches of this research vessel.

The various packs tried are: solid pack in brine and oil, and flakes in oil. Development of 1) tuna viscera-rice bran, 2) tuna scrap meal and 3) tuna glue as possible by-products of the tuna processing industry was also considered.

Oyster Culture Demonstration

Various methods of intensive oyster culture were demonstrated in June 1957 at the Pangasinan Bureau of Fisheries Oyster Firm at Manat, Binmalay.

The deltaic area of the Agno River covering some 600 hectares of brackish tidal water is considered as one of the most highly suitable grounds for oyster culture development in the country.

The oyster farm was once a training ground for students of the Pangasinan Fishery School. The Bureau of Fisheries took it over in January 1957.

Institutions, private firms and individuals particularly interested in oyster culture visited the farm to observe the latest methods in oyster farming.

The farm is currently being enlarged and improved. Investigations into the problems of oyster culture are also being intensified.

THAILAND

Rastrelliger Research

An examination by the Fisheries Department of 1,400 specimens of *Rastrelliger* collected between 21 March to 10 April 1957 in the Ang-thong and adjacent areas showed that although these fish were in different stages of maturity they were not ready to spawn. Plankton hauls in these waters also failed to collect any spawn.

During 30 March to 10 April 1957 schools of *Rastrelliger* were found swimming on the surface at nights in areas with high density of *Noctiluca* sp. The stomach contents of the fish were found to consist of 90% phytoplankton such as, diatoms, seaweed and *Noctiluca* with chlorophyl and 10% zooplankton, chiefly copepods and dinoflagellates.

Preliminary examination of data indicated that the movements of *Rastrelliger* are governed by surface temperature, the density of *Noctiluca* sp. as well as by the availability of other plankton.

Age analyses of the *Rastrelliger* caught in commercial fishing operations suggest that different stocks may intermix.

Survey of Ping River Fisheries

A recent survey of the Ping River fisheries was undertaken to study their present extent, future potentialities and the possible effects on them of the hydroelectric dam being constructed at Yanhi in Tak Province.

It was found that resources are being exploited at an optimum level and that the production is adequate to meet the fish requirements of the population in the neighbourhood.

The survey party was of the view that the failure of strictly freshwater fish in the tropics to negotiate high obstructions on their path, presents special problems in designing suitable fish ladders for incorporation in dams. The construction of such ladders, if a suitable design is evolved, is also a particularly expensive proposition for the under-developed countries. However, the increased spawning grounds resulting from inundation following the construction of the dam, could be economically stocked with spawners to make the upper reaches of the dam independent of any recruitment from downstream. Preliminary to such developments, the Fisheries Department contemplates establishing centres for distribution of fish fry and fingerlings to the affected region.

Common Carp Breeders Flown to Ceylon

The Fisheries Department sent recently by air 6 male and 3 female Common Carp breeders to Ceylon. The fish which were 10-12 inches in length and 400-500 grams in weight were carefully selected from a specially raised stock of breeders. Preparatory to the flight, the fish were held for three days in water in small wire baskets to condition them for crowding during the trip. During this period the fish were also starved in order to reduce their physical activity and carbon-dioxide production, so that damage to as well as high carbon-dioxide concentration inside the package during the shipment would be eliminated.

The fish were transported in oxygen filled plastic bags. On arrival in Colombo after having travelled nearly 1,500 miles in 9 hours, the fish were immediately released in a pond which was kept ready for the purpose. Spawning took place in the morning of the next day.

Research on Nam-Pla

The technological laboratory of the Fisheries Department has been conducting research on *Nam-pla* (fish sauce). It has been found that non-oily fish produce better *Nam-pla* than the oily varieties, leaving the autolysing vats in the sun quickens the process, salt concentrations of 27 to 30 % by weight give products with the highest total nitrogen contents (30-35 mg. N/*l.*). It was also found that leaving the raw material overnight at room temperature cuts down the processing time by about 10-15 %.

These experiments are being repeated to find out the most suitable raw material, the optimum temperature and pH as well as the effects of proteolytic enzymes such as pepsin, and trypsin on the rate of autolysis.

Training for Fishermen

A programme for training fishermen jointly sponsored by the Fisheries Department and the Fish Marketing Organization has been in operation since 1956. During a course lasting six weeks, the trainees are taught navigation and safety at sea as well as the operation and maintenance of marine engines. A participant is charged Tcs. 600 for board and lodging during the training period.

Instructors and lecturers are provided by the Navy, the Customs, the Harbour and the Fisheries Departments. These lecturers are paid by the Government. The expenses for other physical facilities at the training centre are borne by the Fish Marketing Organization from the Fishermen's Welfare Fund financed by a toll of 25 % from the 10 % fish sales commission charged by the Fish Marketing Organization.

During 1956 two courses were held with 35 participants at each. On the successful termination of the training, the participants were given certificates of competency as navigators (fishing boat) by the Harbour Department. The fishermen trained so far have found ready employment on fishing boats. A continuation of the training programme is envisaged.

Training for Boat Builders

Five experts from Japan, one boat designer, one boat building engineer and three experienced boat building carpenters, recently arrived in Thailand to assist the Government in its programme for training the local boat builders. The services of these experts were made available under the Colombo Plan. The International Co-operation Administration of U.S.A. provided equipment worth $6,000 in connection with the programme. The experts are stationed at the Ban-Pae Marine Station where they are currently training the boat building crew of the station, one head carpenter and five carpenters. These trainees are being taught to read blue prints and to construct boats from these as well as to prepare estimates of cost.

After this phase of the work is completed, the experts will, with assistance of Fisheries Department staff, survey the fishing boats of Thailand, to suggest improvements in them as well as to design model craft of different categories suitable for Thai waters. The experts will also build a Japanese type gill netter, with such modification as conditions in Thailand may warrant. Construction of this craft and its operation for demonstration purposes will be financed by the Fisheries Department.

The drawings of model craft designed by these experts will be made readily available to private boat yards which construct most of the fishing craft in Thailand at present.

The programme also provides for the training of two groups of five local boat building carpenters each year.

UNITED KINGDOM

HONG KONG

Improvement of Fishing Craft

During April-June this year, 237 fishing junks were mechanised of which 162 were new boats. Included among them were deep sea trawlers, inshore trawlers, shrimp trawlers, long-liners, hand liners, pures

seiners, gill netters and fish collecting vessels. They represent a total of 74,044 piculs (1 picul = 133 pounds) capacity, 5,875 h.p. of propulsion force and $ 1,067,165 in cost. The strength of the mechanized fleet in the Colony as at 30 June 1957 stood at 1,747 vessels.

Five Government loans of $ 6,000 to $ 9,000 each were given to the fishermen for procurement of marine engines. Of the engines procured with these loans, three went to small longliners and two to purse seiners.

All but 18 of the 162 new boats were constructed in the Colony, 39% of the total having been built at Applichau, Aberdeen. A detailed analysis of all the information collected showed that the vessels built in Hong Kong, although costing slightly more, were on the whole stronger and better than those built in China and Macao.

In 32 of a new boats built during April–June 1957, the conventional "A" bracket to support the long projection of the propeller shaft was eliminated. Six of the new boats were built with steel rudder stocks and blades instead of the cumbersome wooden arrangements previously employed; four had well constructed wheel-houses. These developments are in line with the recent trends in the improvement of fishing craft in the Colony.

Improvement of Fishing Gear and Methods

An otter trawl designed along the lines of a native-type pair trawl but with square wings was constructed by the Fisheries Division crew. This net was operated during April-June 1957 from the Fisheries Division vessel, *Yuen Ling*. Various combinations of sweep wire-length, type of ground-rope, number of floats etc. were tried. The efficiency of this net was compared with that of an already proven small Australian-type shrimp otter trawl which was operated simultaneously on the same fishing grounds, from the Fisheries Division's other vessel *Olenka*.

The Japanese fishing boat operating a form of Danish seine off the East Coast of Hainan continued its activities. The catches during April–June 1957 showed no improvements over those for the preceding quarter. During the former period however the boat was obliged to return to the port earlier than scheduled—twice on account of sickness among the crew and once because of an approaching typhoon.

Training for Fishermen

Five of the six participants, at the 6th Skipper Class run by the Fisheries Division received Marine Department certificates. The sixth candidate went back to the 7th Class which commenced on 1 June 1957.

During April–June this year, 42 fishermen trained at Aberdeen, Cheung Chau, Taipo and Sai Kung received Marine Department certificates of competency as Coxswains. Thirty-nine of these obtained "modified" certificates while the others obtained "full" certificates.

Four of the nineteen participants of the 11th Engineering Class sat and passed the Marine Department examination. The remaining candidates were due to be examined in July. The 12th Engineering Class, with sixteen candidates, was completed in mid–June and the participants returned to their vessels to continue fishing. They are due for examination in October.

Flood Damages Fish Ponds

The unusually heavy rainfall in May 1957, flooded some 1,194 fish ponds, nearly 40% of the total area devoted to fish culture. Over 1,000 piculs of fish, valued at $ 143,400 are estimated to have been lost. In addition, valuable fertilizers added to the ponds were also lost by dilution. In the ponds not flooded, erosion of the bunds was considerable. It is estimated that repair of the damages to the bund would cost approximately $ 10,000, in addition to the labour provided by the workers normally employed on the culture ponds.

By the end of June this year, 15 applications for loans totalling $ 33,900 had been received by the Fisheries Divlsion. These loans were sought for meeting costs of repairs to the bund and for the purchase of fish fry to restock the ponds.

Availability of Fish Fry

Supplies of fish fry from China mainland have once again become normal. Prices also have come down to the levels they were three years ago. This improvement in the situation is a result of complete withdrawal of restrictions imposed by China sometime ago on the export of fish fry and successful spawning by Chinese Carps in the East and West Rivers during the last season. During April-June 1957, Hong Kong fish fry exporters despatched in 15 shipments, by air and sea, a total of 4,853-350 fry of different species of Chinese Carps to Bangkok, Singapore and Taiwan.

In three air shipments to Bangkok of Silver and Grass Carp, totalling 105,000 fry, the mortality was as high as 66 to 100 per cent. In subsequent shipments before which the fry were held for two or three days in water in small wire baskets in order to prepare them for crowding during the forthcoming journey, the mortality was reduced to very low levels.

SARAWAK

Fishery Personnel on Observation Tour

A Fishery Assistant from Sarawak arrived in Japan in November 1956 for a ten-day observation tour of fisheries. He was attached to the Misaki Fisheries Co-operative Association. He also underwent similar courses of training in Malaya, for a period of ten days during February-March 1956, and in Canada for $6\frac{1}{2}$ months commencing mid-April 1956.

The training of this Fisheries Assistant is part of an approved plan for the establishment of a small Fisheries Section staffed by suitably trained local personnel to advise and assist the Government in the development of the fishery industry.

Although a large fishery industry is not at present envisaged for Sarawak waters, there is scope for valuable development as determined by the results of a pilot scheme based on a small motor vessel, using mechanized methods adapted to local conditions and operated by an experienced Fishing Master from Scotland.

SINGAPORE

Training in Deep-Sea Fishing

A scheme for training youths of the local fishing community in deep-sea fishing got underway in mid-May when four young local fishermen sailed out to sea in a Japanese fishing vessel belonging to a Singapore firm.

The scheme has been worked out by the Fisheries Department, the Malaysian Ship Officers' Union, the Labour Department and local fishing concerns. The trainees aged between 18-20 years, receive a monthly wage of $ 60, an extra allowance of $ 12 and free meals. They are under contract to the firm for three years during which time, it is hoped, they will have gained sufficient experience in deep-sea fishing.

Since the scheme was first publicized in April this year, 154 applications have been received. It is hoped that more trainees will be accommodated when the anticipated additional fishing vessels which the firm is arranging to charter from Japan are commissioned.

UNITED STATES OF AMERICA

HAWAII

Oceanography processing

The establishment of a pattern of ocean monitoring stations designed to describe seasonal and annual variations in mid-ocean is nearly completed by the Pacific Oceanic Fishery Investigations (POFI) Laboratories of the U.S. Fish and Wildlife Service. During January-March 1957 collection of surface temperature and salinity data was started at the following locations: (1) Ocean Weather Station Victor, (2) Midway Islands, (3) French Frigate Shoals, (4) Upolu Point, Hawaii, (5) Johnston Island, and (6) Wake Island. Observations and collections will be made on Tuesday of each week and forwarded to POFI laboratories at about 12-week intervals.

Weekly sampling at Koko Head, Oahu, continued, and temperature showed a drop ftom 75.7°F. to 71.8°F. between 2 January and 13 March. This minimum is about 0.7°F. below the minimum recorded for last year. In addition, records from the established Christmas Island station were continued to be obtained and currently, records from the S.S. *Mariposa* and S.S. *Monterey* are also being collected. The two vessels, sailing between Honolulu and Tahiti and between Honolulu and Pago Pago, take surface temperature readings and salinity samples at 80-mile intervals. Their schedules provide for one such section each month and a total of 10 months' records are already available with POFI.

A POFI monitoring survey and one *Makua* survey in waters adjacent to Oahu were completed during Junuary-March 1957. In contrast to January 1956, leeward surface temperatures this year were higher than windward temperatures. The depth of mixed layer was greater in January 1957 than in January 1956 for both the leeward and windward areas.

Surface Temperatures in North-eastern Pacific

Analysis of sea surface temperatures gathered by merchant ships in the northeastern Pacific during the period 10-20 April 1957 has just been completed by POFI. One thousand eight hundred observations were available, furnishing a reliable basis for contouring. Comparison with mean temperature conditions suggests that mid-ocean areas were warmer than usual and waters adjacent to the coast were colder than usual for this period of the year. This work is presently being conducted on a trial basis to determine the feasibility of utilizing these observations for following seasonal and annual changes in the areas of the albacore fisheries. If the material seems adequate, attempts will be made to relate the seasonal and annual temperature differences to those in albacore distribution, perhaps ultimately to predict changes in the albacore fisheries.

Equatorial Tuna Research

POFI has completed the processing and preliminary analyses of the oceanographic and biological data from the September-October 1956 cruises of the *Hugh M. Smith* and the *Charles H. Gilbert* to the Marquesas. The manuscript is awaiting Washington approval for publication. The oceanographic data from these cruises suggest that the westward flowing waters of the South Equatorial Current are affected by the emergent land masses and submerged but shallow banks of the Marquesas and Tuamotus islands. What appear to be rather large vortices are found downstream from the eastern limits of these islands. High surface phosphates (1.0 to 1.5 μ. at/*l.*) are associated with these features. As to the indices of basic productivity, the rate of carbon fixation in waters immediately downstream from the Marquesas rises to 0.6 mg. C/m.^{3}/hr., as compared with 0.16 to 0.2 in the more oceanic waters to the east. Zooplankton volumes to the west of the Marquesas are from 50 to 60 cc./1000m.^{3}, decreasing to 23 to 28 cc./1000m.^{3}. Moving north of 17°-18°S., the carbon fixation rapidly increased to 0.5 to 0.6 mg. C/m.^{3}/hr. and zooplankton volumes to 40 to 60 cc./1000m^3. The "normal" high surface phosphates (0.5 to 0.8 μ. at/*l.*), rates of carbon fixation (0.4 to 0.6 mg. C/m.^{3}/hr.), and zooplankton volumes (60 to 70 cc./1000m.^{3}) were found associated with the upwelling at or near the Euqator.

POFI's three vessels returned in March from a repeat survey of the Marquesas-Tuamotus area, this time assessing the oceanographic and marine biological conditions during their summer. Although there has not been sufficient time to examine the results of the oceanographic data, interesting comparisons may be made between the observed distribution and availability of the fish during the southern hemisphere winter and summer.

During August of 1956 a complete circuit of the Marquesas group was made for the purpose of enumerating tuna schools at the surface. During January 1957 and approximately a month later in February, similar circuits were made. The number of schools sighted was 33 in August 1956, 80 in January 1957, and 89 in February 1957.

Another vessel, while occupying 10 longline fishing stations during the first 10 days of February 1957, sighted 37 bird flocks indicative of tuna schools in the offshore vicinity of the Marquesas.

Indications are strong that surface tuna schools are much more available during the

Marquesan summer than during their winter. It further appears that deep-swimming tunas are more available during the Marquesan summer. Five longline fishing stations were occupied in early September 1956 in the offshore Marquesan area and 10 were occupied in the same area in early February 1957. Catch per 100 hooks (all tunas) was 1.55 in September 1956 and 3.90 in February 1957.

Identification on *Auxis* and *Euthynnus*

To eliminate problems in nomenclature, POFI has been engaged in the identification of larval *Auxis* and *Euthynnus* on a world-wide basis to include juvenile and adult fish. The larval distribution of these genera has been summarized, and about half of the drawings completed for a proposed manuscript.

In respect to the identification of larval *Neothunnus*, *Parathunnus*, Germo, etc., on a world-wide basis, the larvae of a local scombrid, *Scomber japoricus*, was tentatively identified, thus eliminating one variable from the ultimate analysis. In addition, an Italian paper, unavailable to POFI until recently, has given the first clue as to the morphology and pigmentation of larval albacore. Although it is not sure that this paper really deals with albacore, the specimens are unlike anything seen previously (*Dana* collections excepted), and are different enough to warrant the name.

Distribution of Larval Tuna

A comparison has been made between the larval tuna catches of surface, 200-meter oblique, and 3-level closing hauls conducted on *Hugh M. Smith* cruise 33. It appears that at night a surface or a 0.60 meter tow is quite superior to deeper tows for catching tuna larvae in quantity. Typical half-hour catches at various towing depths were as follows: 0 meters – 10; 0-60 meters – 11, 70-130 meters – 1; 140-200 meters – 0.5; 0-200 meters –1.5. From 0-60 meters about one-half to two-thirds of the larvae were skipjack, one-third frigate mackerel, and one-tenth yellowfin. At depths greater than 60 meters most of the catch was larval frigate mackerel.

A detailed study of the vertical distribution of larval tuna is in progress, based on analysis of the catches made by 3-level closing nets on EASTROPIC. Out of 142 samples thus far sorted, the largest single catch was only seven larvae. A study of the reliability of a single surface tow is also being made based on the replicate samples collected on *Hugh M. Smith* cruise 38.

Albacore Research

Studies by POFI of albacore catch data have almost completed. An estimate of the catch per unit of effort of subsurface albacore by longline and the troll catch per unit of effort was made for various temperatures.

An estimate of the catch per unit of effort at various temperatures was obtained for both fall and winter longline catches by first computing the hook depths from the results of sounding tube studies and then using these depths to estimate the temperatures from the on-station bathythermograms. The winter estimate showed a peaking of the catch at about 56°F. to 58°F., with the majority of the catch being made between 55°F. and 63°F. Although the data are few, all sizes of albacore were taken over approximately the same range of temperature. The fall temperature ranges were too broad to provide a reliable estimate, but

there did appear to be a peaking at 56°F. or at about the same temperature noted for the winter catch.

The number of troll-caught albacore plotted against temperature gave an extreme range of 52°F. to 66°F. The curve was jagged with a dominant peak extending from 59°F., to 60.5°F., with a smaller peak at 63°F. and a smaller well-separated peak at 52°F. A breakdown of the data as to season (summer and fall) and area (eastern and central Pacific showed two paramount features. First, the central Pacific albacore have the overall temperature range described above while the eastern Pacific albacore are restricted to the center of the temperature range. Second, the peak observed at 63°F. was associated with the fall catches in the eastern Pacific.

The current phase of the albacore age, growth, and spawning studies were completed and manuscripts are with the POFI editorial board. The results of attempts to determine the age of albacore by the use of "hard parts" were negative. It was concluded that the formation of vertebral rings was ecological rather than temporal.

Skipjack Research

POFI field work during May 1957 centered almost entirely around a pre-season skipjack tagging programme in Hawaiian waters. Approximately 2,000 tagged fish were released. All of the tags were of the plastic harpoon type. The programme was somewhat handicapped by the lack of suitably large skipjack in Hawaiian waters at the time of tagging, the great bulk of the schools encountered being composed of 1- to 2-pound fish. Fish of this size were, however, surprisingly abundant. To date there have been six recoveries from the commercial fleet. These indicated a westerly movement of skipjack in the Islands area. None of the tagged fish had been out long enough to enable an evaluation of the healing rate of the tag wound. Two factors suggest that the tag will be successful: (1) in practically every instance the tagged fish were seen to swim normally after release, and (2) no tagged fish has been recovered from the stomachs of large marlins and spearfish despite a programme of market sampling. In contrast, in 1955 when smaller numbers of skipjack were tagged with the conventional spaghetti tuna tag, four recoveries were obtained from predators. These were fortuitous recoveries not resulting from a sampling programme. It appears that immediate survival of skipjack tagged with the new tag may be considerably higher than that of skipjack tagged by the older method.

VIETNAM

Fisheries Sverices Amalgamated

The two Fisheries Services, Service des Peches Continentales (Inland Fisheries Service) and Service des Peches Maritimes (Marine Fisheries Service), have by a recent decree been amalgamated into a single unit, Fisheries Directorate. Formerly, the Ministry of Public Works was responsible for the marine fisheries while the Ministry of Agriculture administered the inland fisheries. The amalgamated Fisheries Directorate is now controlled by the Ministry of National Economy. The new Directorate has under its control 4 Services concerned with Fish Production, Fish Culture, Food Technology and Socio-economics.

Development of the Plain of the Rushes

A comprehensive plan for the development of the *Plain of Rushes (la Plaine des Joncs)* has recently been put into operation. The Plain lying in northern South Vietnam comprises 7 provinces which are periodically flooded by the waters of the Mekong during the 4 months of the monsoon. During these floods the Plain provides natural feeding and spawning grounds for fish.

The development programme aims at: increase in fish production, rehabilitation of the spawning grounds, creation of fisheries reserves, regulation of the fisheries in order to obtain a maximum sustained yield and assistance to fishermen for improving their efficiency of operation as well as their economic status.

Under the supervision of the former Inland Fisheries Service the deepening of some of the natural ponds started during the last dry season and more then 12,000 sq.m. of earth have already been moved. Regulations for controlling the exploitation of the fisheries of the Plain have already been submitted to appropriate authorities for final approval. A recently formed co-operative society of fishermen of Bin-Than, Kien Phong province received substantial aid in cotton yarn and ropes for making nets.

Organization of Fishermen's Co-operatives

The former Marine Fisheries Service organized 33 fishermen's co-operatives during 1955–57. The membership of these societies stands at present at 5,250 and the working capital at VN$ 2,207,700. These societies have regularly received advice from the Government in the running of their organizations. In addition, VN$ 20,500,000 from USA aids have been loaned to these societies.

FAO ACTIVITIES

Training Centre in Fishery Co-operatives and Administration

FAO has sent official invitations to the Member Governments of the Indo-Pacific Fisheries Council for participation at the for thcoming FAO/IPFC International Training Centre in Fishery Co-operatives and Administration which will be conducted in Sydney, Australia over a period of six weeks beginning 16 December 1957. The Government of Australia has formally invited FAO to hold the Centre in their country. Australian representatives recently signed in Rome an agreement between their Government and FAO arranging for the Centre. The Government of Canada will also co-operate in running the Centre.

The Centre is intended to provide an intensive course of practical instruction, demonstration and discussion, directed to the special problems of organization and methods in fishery co-operatives. It is primarily designed for co-operative leaders and government officials specifically responsible for co-operative organization in fisheries.

The course will comprise:

I. A series of practical demonstrations based on the organization, management and day-to-day working routine of fishery co-operatives in New South Wales and South Australia, mainly in the vicinity of Sydney and Adelaide. Special attention will be paid to business management and financial arrangements in relation to the supply of fishing requisites, and the collection, handling and disposal of members' catches.

2. A series of lectures under the following main headings:

a) Theoretical Considerations:

i. Objectives of co-operation
ii. Government policy and functions
iii. Constitution and direction

b) Practical Co-operation:

i. Organising and running a co-operative society
ii. Co-operatives for the supply of fishermen's requisites, gear, materials, salt, ice, fuel, stores, etc.
iii. Fish marketing
iv. Credit and thrift
v. Welfare
vi. Co-operative education
vii. Miscellaneous

3. A series of seminars for the review of the subject-matter of the lectures with special reference to problems encountered by the participants in the promotion of fishery co-operatives in their respective countries.

4. A series of workshops, the purpose of which will be to give participants an opportunity to analyse actual situations, to examine the advantages and disadvantages of different forms of co-operative activity, and to work out their own proposals for the most effective means of co-operative organization and development. The latter will be discussed collectively and individually with a group of specialists in attendance at the Centre.

It is planned that the first four weeks of the course will be based on St. John's College, Sydney University, after which the students will be transported to Adelaide, the final two weeks being spent at various South Australian fishing ports and in Adelaide, where the course will terminate.

FAO has requested participating governments to supply a comprehensive statement showing the current state of development of the co-operative movement in their fisheries, in order to ensure that the course is conducted in recognition of the most recent progress in the region, and of the most immediate problems confronting the governments concerned.

The instructors will be Australian lecturers selected by the Government of Australia, and a number of specialists engaged by FAO by virtue of their international reputation in fisheries and their first-hand experience of conditions in the Indo-Pacific region. The Government of Australia will also provide guides, demonstrators, etc., during demonstrations in the field.

At the conclusion of the Centre, certificates will be issued to the participants who have fulfilled the requirements of the course, stating the subjects studied and the activities pursued.

Dr. Job visits India

Dr. T.J. Job of the Biology Branch of FAO Fisheries Division broke his home leave, 7 June to 28 August, to establish contacts in India for collaboration in the survey of the living aquatic resources of the Ganges–Brahmaputra basin. Arriving in Bombay on 8 June, he met the ecological workers of various research institutes and the Bombay University. Dr. Job then proceeded to Delhi where he conferred with officers of the Fisheries Division of the Ministry of Food and Agriculture, and fisheries research workers of the Delhi University, the

Institute of Applied Research and the UNESCO Scientific Documentation Centre. In Calcutta, Dr. Job met officers of the Central Inland Fisheries Research Station, the West Bengal Fisheries Directorate, Zoological and Botanical Survey of India, as well as fisheries workers in the Calcutta University and documents officers of the National Library and the Asiatic Society.

Dr. Job also visited various fisheries institutions where discussions were held on the present activities of the institutions with particular reference to limnological and other biological surveys, on the availability of facilities for training of FAO fellows and recruitment of consultants and experts.

Mr. Miyake's Tour of the Region

Mr. Y. Miyake will represent the FAO Fisheries Division at the meeting of FAO/ECAFE Joint Working Party on Agricultural Development and Planning in Bangkok, 10-20 September 1957. *En route* he will stop in Bombay, Calcutta, Colombo and Singapore to explore the possibilities of expanding the current survey of the Role of Middlemen and Co-operatives in Fisheries into a full fledged regional programme.

Documents and Publications

A mimeograph draft of the *Handbook of Preliminary Fisheries Surveys* was circulated at the 7th Session of the Indo-Pacific Fisheries Council at Bandung, 13-27 May 1957. The Handbook is intended to help fishery administrators of underdeveloped countries in conducting simple preliminary surveys of fishery industries. During the next two or three years the value of this *Handbook* will be tested in several countries. Copies of this draft are available on request from the IPFC Secretariat.

A Bibliography of Co-operatives has been prepared and sent to fishery workers in 15 countries for additions and comments. The completed *Bibliography* will be used at the forthcoming FAO Training Centre in Fishery Co-operatives and Administration at Sydney and Adelaide, Australia, December 1957 and January 1958.

A working draft in English of the section on curing in the *Technological Dictionary* was completed with index and circulated for criticism and suggestions. About 50% of the material for the section on fresh and frozen fish in this *Dictionary* has been collected and compiled in draft form. These sections of the *Dictionary*, after clearance by governments and research organizations, will be available in mimeograph form pending the final printing of the complete *Dictionary*.

FAO Fellowships in Fisheries

Mr. N.C. Koli, Managing Director, Bombay State Fishermen's Co-operative Association (BSFCA), Bombay, India, was awarded an FAO Fellowship for six months to study fishery organization and methods with special reference to the principles and techniques applied in modern fishermen's co-operative organizations.

A graduate in law of the Government Law College, Bombay, Mr. Koli began in 1942 to work with the BSFCA which is a federal co-operative organization, with 55 fishermen's co-operatives affiliated. The BSFCA undertakes the marketing of fish in Bombay on behalf of its affiliated member societies, to which it supplies fishery requisites.

Mr. Koli left India for Hong Kong at the beginning of March 1957. His itinerary is: Hong Kong - 2 weeks; Canada - 2 months; Sweden - 6 weeks; Denmark - 4 weeks. On

the way from Hong Kong to Canada, Mr. Koli stopped over in Tokyo to observe co-operative fish marketing activities.

Mr. Toshio Homma, Chief, Data Branch, Data and Statistics Section, Fisheries Agency, Ministry of Agriculture and Forestry, Japan, was awarded an FAO Fellowship for six months to study the organization of fish handling, distribution and marketing. Mr. Homma will spend 1 month in Germany; 1 in Netherlands; 1 in Sweden; 1 in Norway and 2 in the United Kingdom; visiting the various fisheriesorganizations and installations in thesecountries. Before the commencement of his tour Mr. Homma will be briefed for 2 weeks at FAO Headquarters in Rome.

Mr. Masayasu Kato, Chief, Marketing Branch, Aquatic Products Section, Fisheries Agency, Ministry of Agriculture and Forestry, Japan, was awarded an FAO Fellowship for two months to study the handling, transportation, marketing and distribution of fruit, vegetables and fish. Mr. Kato will spend five weeks in the U.K., 3 weeks in Norway, Germany and the Netherlands.

FAO Fellow from Mexico visits Thailand

Senor Francisco Obregon Fernandez of Mexico visited Thailand for about a week in mid-July as part of his study tour of countries with well-developed fish culture techniques. Senor Obregon was travelling under an FAO fellowship and before arrival in Thailand he had visited Yugoslavia, Germany, Italy, Israel and India.

Senor Obregon was educated at the Westchester Military Academy and Peekskill Military Academy, Peekskill, New York (1921-25). During 1936-40 he worked on fish cultivation at the Fish and Game Department of mexico. During 1940-53 he headed the Technical Office of Inland Fisheries, Commission for the Promotion of Rural Fish Culture. Since 1953 Senor Obregon is in Charge of the Rural Fish Farming Project of the Mexican Banco Nacional del Credito Ejidal.

Although his stay in Thailand was brief, Senor Obregon said that he was particularly impressed by the Thai method of breeding and rearing Common Carp under tropical conditions and he believed that he had learnt much that will be extremely valuable to him in developing rural fish farming in Mexico. He hoped to develop a technique, based on what he learnt in Thailand together with his knowledge of skills and techniques developed by fish farmers in Israel, particularly in relation to the culture of the Common Carp, appropriate for Mexican conditions.

Senor Obregon left Thailand to continue his tour through Singapore and Indonesia from where he will return to his country via Rome.

IPFC AFFAIRS

7th Session of the IPFC

The 7th Session of the Indo-Pacific Fisheries Council (IPFC) was held in Bandung, Indonesia, from 13-27 May 1957. Fourteen of the sixteen Member Governments participated (Pakistan and Burma

not being represented). Portugal participated as an Observer Government. In addition, several organizations also participated as Observers.

Over 150 working, technical and contributed papers were presented and discussed at the Session. Of these 20 were contributed by by FAO, the rest being from Member Governments and the Council Secretariat. These papers dealt with the various problems of fisheries development and research in the Indo-Pacific area in general and in the Member Countries of the IPFC in particular.

Among the important subjects recommended for early attention by Member Governments and FAO are: a seminar on the *Rastrelliger* fisheries to be followed up by a systematic survey of the these fisheries, a critical study of the fish processing industry, the mechanization of fishing craft, a factual survey of fishery co-operatives and credit facilities for fishermen and training centres for fishing boat builders, fishing boat navigators and engineers, and fish processors.

A Fish Marketing Sub-Committee which was formed at the Session will make a factual survey of the fish marketing conditions in the 16 member countries of the Council. Recommendations were also made for the speedy publication of fishery "Handbooks" and "Manuals" which are essential for the systematic survey of the fisheries in the region.

With respect to FAO technical assistance, the Council urged Member Governments to consider the advantages of 'Group Country Projects' under which the services of one or more technical experts may be shared by several countries with similar problems. Such projects ensure a maximum utilization of funds available through FAO and similar agencies for technical assistance and at the same time produce quicker results for governments taking advantage of the facilities.

The Council decided to hold the 8th Session towards the end of 1958. Although no formal invitation has yet been received from any Member Government to act as host for the 8th Session, indications are that Ceylon may extend such an invitation.

The subject for the Symposium at the 8th Session is "Fish behaviour with special reference to pelagic shoaling species."

The following Office-Bearers were elected for the period between the 7th and the 8th Sessions:

The Council

Chairman : Dr. K. Kuronuma (Japan)
Vice-chairman : Dr. Tham Ah Kow (U.K.; Federation of Malaya)

Technical Committee I

Chairman : Mr. H. Saanin (Indonesia)
Rapporteur : Dr. A. L. Tester (U.S.A.; Hawaii)

Panel A

Chairman : M. Cao Thien Buu (Vietnam)
Rapporteur : Dr. G. R. Fish (U.K.; Federation of Malaya)

Panel B

Chairman : Mr. R. Soelaeman Natadisastra (Indonesia)
Rapporteur : Dr. Tham Ah Kow (U.K.; Federation of Malaya)

Chanos Sub-Committee

Chairman : Dr. G. R. Fish (U.K.; Federation of Malaya)

Hilsa Sub-Committee

Chairman : Dr. N. K. Panikkar (India)

Rastrelliger Sub-Committee

Chairman : Mr. V. Soesanto (Indonesia)

Technical Committee II

Chairman : Mr. G. M. Charidjie Kasuma (Indonesia)
Rapporteur : Mr. L. F. Tisseverasinghe (Ceylon)

Panel A

Chairman : Mr. W. D. Orchard (U.K.; Hong Kong)
Rapporteur : Mr. Foo Fah Lin (U.K.; Federation of Malaya)

Panel B

Chairman : Mr. Harsono Hardjohutomo (Indonesia)
Rapporteur : Mr. E. H. Dahlgren (U.S.A.)

Panel C

Chairman : Mr. N. Oka (Japan)
Rapporteur : Mr. I. Petersen (U.K.; Hong Kong)

Marketing Sub-Committee

Chairman : Mr. I. Petersen (U.K.; Hong Kong)

PERSONALIA

Dr. N.K. Panikkar, Chief Research Officer, Central Marine Fisheries Research Station, Mandapam, India, was appointed Fisheries Development Adviser to the Government of India on 26 April 1957, following the retirement from service of Dr. B.N. Chopra.

Dr. Panikkar, a leading fisheries scientist of the Indo-Pacific area, has been actively concerned in promoting fisheries development not only India but also on the whole Indo-Pacific region. Since its creation, Dr. Panikkar has given his unfailing support to the Indo-Pacific Fisheries Council which he served as Chairman of Technical Committee I during 1953-1954, and as Chairman of the Council during 1955-57. As out-going Chairman Dr. Panikkar is currently *ex-officio* member of the Executive Committee of the Council.

Mr. Daniel H. Janzen, Regional Director of the U.S. Fish and Wildlife Service, has been promoted to the post of Director of the Service's new Bureau of Sport Fisheries and Wildlife, according to an announcement on 8 February 1957 by Secretary of the Interior, Mr. Fred A. Seaton.

Mr. Janzen replaces Mr. John L. Farley, Acting Director, whose resignation was accepted by Mr. Seaton. Mr. Seaton said an announcement will be made shortly on the appointment of a director for the separate Bureau of Commercial Fisheries. Both Bureau Chiefs will act under the direction of Mr. Ross L. Leffler, recently named as Assistant Secretary for Fish and Wildlife.

Mr. Janzen has been with the Federal Government since 1929, when he joined the staff of the United States Bureau of Biological Survey. When the Biological Survey and the Bureau of Fisheries were consolidated in 1940 to from the Fish and Wildlife Service, Mr. Janzen continued with the Service. He became Assistant Regional Director of Region 3, Headquarters in Minneapolis, Minn., in 1940 and in July of 1946 he was named head of that Region.

Mr. Lennart Mattsson arrived in Indonesia and assumed charge as Head of UNESCO Science Co-operation Office for Southeast Asia effective 1 July 1957.

Mr. Jan Smid, previously Acting Head of the Office, who has left Indonesia to take up another assignment with UNESCO, was always keenly interested in fisheries matters and made valuable contribution in his capacity as Observer on behalf of UNESCO at several IPFC Sessions. Mr. Smid made many firm friendships during his association with the IPFC, and his departure will cause a sense of personal loss to many fisheries workers in the Indo-Pacific region.

Mr. Pierre A. Lusyne (Belgium) joined the staff of the Technology Branch, Fisheries Division, FAO, on 1 June 1957 as Fisheries Technologist (Gear Specialist), Fishing Gear Section, to assist in the preparation for and supervision of technical assistance projects in the field of fishing gear and methods.

Mr. Lusyne holds 1st class certificates as fishery skipper, engineer and wireless operator. Obtaining his first command in 1937, he continued as a skipper until 1943. During the second World War, Mr. Lusyne served with the Belgian section of the British Navy and earned five awards, French, Belgian and British. After the War he was a technical instructor at the Ostend School of Fisheries until he went to India in 1955 as FAO/ETAP expert.

In India, Mr. Lusyne studied the fishing methods on the entire coast and organized Training Centres for fishermen. These Centres are now being run by the counterpart assistants who were trained by Mr. Lusyne.

Mr. Lusyne also acted as Co-Director at the South Pacific Fisheries Training Course at Noumea, New Caledonia, 19 November 1956 to 23 February 1957.

Mr. D.W. Le Mare, Director of Fisheries, Malaya is due to retire from the services of the Government of the Federation of Malaya on 18 August 1957.

Mr. Soong Min Kong will be in charge of the Pan-Malayan H.Q. of Department of Fisheries in Penang, as acting Director of Fisheries, Malaya, in the first place.

Dr. Tham Ah Kow, Chief, Fisheries Officer, Singapore, is in charge of the Department of Fisheries in Singapore.

Mr. Allan Bogg has been appointed Senior Research Officer (Economics) with the Commonwealth Fisheries Office (Department of Primary Industry) vice Mr. F.J. Kearns, who transferred to another Department.

Mr. Bogg took his Bachelor of Economics degree from Sydney University in 1950 after four and a half years' Army Service. He entered the Commonwealth Public

Service in January 1951, and was first attached to the Sydney office of the Department of Commerce and Agriculture. Early in 1952 he was appointed to the Commonwealth Fisheries Office as an Assistant Research Officer. In 1953 he was promoted to Research Officer Gr. I.

During 1956, Mr. Bogg visited England and Europe and worked for about three months with the U.K. Ministry of Agriculture and Fisheries and the White Fish Authority.

Mr. S. M. Manirul Islam joined, on 22 June 1957, the Central Fisheries Department as Deputy Director of its branch in East Pakistan. Prior to his new position, Mr. Islam was Deputy Director in the Provincial Fisheries Directorate of East Pakistan.

Mr. Chau Yiu Kee, Assistant Scientific Officer, Fisheries Research Unit, University of Hong kong was awarded a UNESCO fellowship to study techniques in chemical oceanography and interpretation of data, from January to December 1957, under Dr. D. J. Rochford of the CSIRO Division of Fisheries and Oceanography, Australia.

Mr. T. S. Satyanarayana Rao, Junior Fellow of the National Institute of Science, India was awarded a UNESCO fellowship to study biological oceanography, particularly plankton migration and light penetration in seawater, from October 1956 to September 1957, under Dr. B. Ketchum at Woods Hole Oceanographic Institution, U.S.A.

Mr. Shizuwo Ishiguro, Chief of the Instrument Branch, Nagasaki Marine Observatory, Japan was awarded a UNESCO fellowship to study the practical application of electronic techniques in oceanographic research, from January to December 1957, under Dr. G.E.R. Deacon of the National Institute of Oceanography, United Kingdom.

Commander Amnuay Srivirojna of the Thailand Navy was awarded a UNESCO fellowship to study field practices, laboratory techniques, processing of results, and interpretation of data in oceanographic research, from January to December 1957, under Dr. R. R. Revelle of the Scripps Institution of Oceanography, U.S.A.

Mr. Sanan Ruamraksa, Fishing Gear Technologist, Department of Fisheries, Thailand was awarded a Colombo Plan fellowship to study gear manufacture and net preservation and mechanised fishing operation; from May to October 1957, at one of the eight Regional Fisheries Research Laboratories and Omi Silk Net Manufacturing Co. and Mamoi Manufacturing Co.

Mr. Umpol Pongsuwana, Chief of Bangkhen Fisheries Station, Department of Fisheries, Thailand was awarded an ICA fellowship to study development and management of inland fisheries; from October 1957 to July 1958, at Alabama Polytechnique Institute, Aubern, Alabama, U.S.A.

Mr. Sant Bandhukul, Fishery Officer (Rastrelliger Investigations), Fisheries Department, Thailand was awarded an ICA fellowship to study fisheries biology and biometry, from September 1957 to August 1958, at the University of Miami, Florida, U.S.A. Time permitting, Mr. Sant may go to Stanford to become familiar with problems of the Pacific sardine fishery. He will also select and procure equipment for fisheries biological and biometric research of the Department of Fisheries, Thailand.

Mr. Udom Sungkasarp, Proprieter of a private firm in Bangkok with recognised interest in the development of fisheries in Thailand was awarded an ICA fellowship to observe handling, marketing and distribution of fish and fish products in New

England, Florida, the Gulf of Mexico and the pacific Coast of U.S.A., from August to November 1957.

Mr. Lev-ang-Dang, Assistant to the Chief of the Service des Peches Continentales of Vietnam was awarded a fellowship by the French Economic and Technical Aid Mission. Mr. Dang left in February 1957 for France where he will spend 8 months studying hydrobiology at various pisciculturał stations.

CURRENT READING

Hydro-Electricity and Nature Protection, *Pro Natura, Vol. II, 1955, 224 pp.* Union Internationale Pour la Protection de la Nature, Bruxelles.

Contains a selection of technical papers from amongst those presented at a discussion on "Hydro-Electricity and Nature Protection" held during the Caracas Assembly of the International Union for the Protection of Nature in the summer of 1952. The 24 technical papers, included in the volume, approach from several specialist and technical angles the problems created by man's use of hydrological resources as it affects the protection of nature and as exemplified in the "biocoenosis" of all organic life. Fair opportunity is allowed to the case presented by the engineers and the economic and social interests which they serve. An important point which is strongly made is that organizations charged with the promotion of hydro-electricity projects should avail themselves of competent ecological advice at an early stage in the development of their plans. Of special interest to fisheries workers and administrators is a paper entitled "Dams and their relation to Fish and Wildlife in the United States of America" by Rudolph Dieffenbach, 77-82 pp.

The Physiology of the Pituitary Gland of Fishes, by Grace E. Pickford and James W. Atz, New York Zoological Society, N.Y., U.S.A., 1957, xxxiii + 637 pp.; $ 6.00.

A review of the extensive and widely dispersed literature on the physiology of the pituitary gland of fishes. Methods of treating fishes with gonadotropic hormones, in order to induce reproduction in captivity are described in detail, including the extensive fish cultural work that has been performed in Brazil, Japan and the USSR. All known experiments, up to June 1956, concerning the pituitary gland and pituitary physiology of fishes are summarized in 54 tables. An Addendum covers, insofar as possible, the literature for the last months of 1956. The technique of hypophysectomy is discussed in an Appendix. There is a combined Bibliography and Author Index, consisting of 1,905 complete bibliographic references, accompanied by page references to citations in the text and tables. Cross references to co-authors are included. There is also a detailed Subject Index.

Assembly Methods for Otter-Trawl Nets, *Fishery Leaflet 437,* U.S. Fish and Wildlife Service.

Describes with a minimum of text and many illustrations the type and assembly of standard trawl nets. Methods of lacing parts of webbing are described. In addition, assembling an Iceland trawl net and bending the trawl net are also described. In the discussion on bending the trawl net, are illustrated methods of attaching the head rope, floats, attaching the foot rope, belly lines, door ends, quarter ropes, footrope rollers, the splitting strap, and the cod-end rope. Three tables are included giving specifications of cotton, manila, and synthetic twines.

Free copies of *Fishery Leaflet 437* may be obtained from the Division of Information, U.S. Fish and Wildlife Service, Washington 25, D.C.

Cold Storage Design and Refrigeration Equipment, *Fishery Leaflet 427, Refrigeration of Fish—Part 1,* U.S. Fish and Wildlife Service.

"Cold Storage Design and Refrigeration Equipment" is one of a series of five leaflets on the refrigeration of fish recently released by the Service.

The first section of this leaflet is concerned with design and construction of single- and multi-storey cold-storage warehouses, the economics governing the type of construction and design selected, and technical data required for the guidance of the processor in in his choice.

The second section consists of refrigeration equipment available and the respective advantages and disadvantages for specific tasks.

The third section develops the requirement as affected by the type of load; the various freezing methods presently in use are then described and evaluated. Information on particular illustrative systems of freezing and their respective freezing rates are presented.

In addition to this leaflet (*Part 1*), also available are *Part 3,* "Factors to be Considered in the Freezing and Cold Storage of Fishery Products"— *Fishery Leaflet 249; Part 4,* "Preparation, Freezing and Cold Storage of Fish, Shellfish, and Precooked Fishery Products"—*Fishery Leaflet 430; Part 2,* "Handling Fresh Fish"—*Fishery Leaflet 428; and Part 5,* "Distribution and Marketing of Fishery Products"—*Fishery Leaflet 431.* Copies of any or all of the leaflets issued in this series are obtainable free from the Division of Information, U.S. Fish and Wildlife Service, Washington 25, D.C.

Fishery Publication Index 1920-54, *Circular 36,* S.U. Fish and Wildlife Service, 1935; 254 pp. (Processed), $ 1.50.

The Service's publications dealing with only fishery subjects in each series are listed in this index. The index is in three parts; (1) A serial list of the numbers issued in each publications series, omitting numbers that did not pertain to fisheries; (2) an alphabetical index of subjects. In the author index and in the subject index, the references are to numbers in the series lists.

The publication series listed are:

Administrative Reports, Circulars, Conservation Buletins, Current Fisheries Statistics, Documents, Economic Circulars, Fishery Bulletins, Fishery Circulars, Fishery Leaflets, Investigational Reports, Market Development Leaflets, Progressive Fish Culturist, Regulatory Announcements, Research Reports, Separates (Reprints), Special Scientific Reports, Special Scientific Reports—Fisheries, Statistical Digests, Statistical Lists, Test Kitchen Series.

The publications issued by the Bureau of Fisheries before 1920 were indexed in "An Analytical Subject Bibliography of the Publications of the Bureau of Fisheries, 1871-1920," by Rose M.E. MacDonald, *Bureau of Fisheries Document 899*. This document, though out of print, may be consulted in many libraries.

Index and List of Titles, Publications of the Fisheries Research Board of Canada, 1901-1954, by Yvonne Bishop *et al, Bulletin 110,* Fisheries Research Board of Canada, 1957; xii + 209 pp., $ 0.75.

The subject-author index presented has been prepared as a guide to the published work of thc Fisheries Research Board of Canada.

The index has been prepared mainly from the titles of the articles, with some reference to the abstracts, subheadings and conclusions. With the biological papers, the aim has been to list the main references to species and localities, and the kind of information obtained. Technological subjects are listed under the type of process concerned and the kind of product involved, as well as the fisheries source material. Name of authors and co-authors of papers are also included in the index.

The index is followed by an appendix listing the titles of the papers which appeared in the various publication series, The publication series covered are:

Contributions to Canadian Biology, Contributions to Canadian Biology (New Series), Contributions to Canadian Biology and Fisheries (New Series), Journal of the Biological Board of Canada, Journal of the Fisheries Research Board of Canada, Canadian Atlantic Fauna, Canadian Pacific Fauna, Studies from the Board's Stations (reprints), Studies from the Biological Stations of the Fisheries Research Board of Canada, Studies from the Technological Stations of the Fisheries Research Board of Canada, Research Bulletins of the Newfoundland Government Laboratory, Service Bulletins of the Newfoundland Government Laboratory.

Series of the Board's publications not included in the index are:

Annual Reports, Progress Reports of the Atlantic Coast Stations, Progress Reports of the Pacific Coast Stations.

Titles of papers appearing in the above publications are however listed in the Appendix.

COMING EVENTS

9th Pacific Science Congress

The Standing Committee on Fisheries is organizing several general discussions and symposia for the Congress on matters relating to fisheries. Some of these are being organized in co-operation with the Oceanography and Zoology Divisions. The various topics are:

Techniques of measuring oceanic productivity.

Marine biology of animal life in hot tropics, with special reference to the Indo-Pacific area.

Marine upwelling, biological aspects.

Oceanography and marine resources of the Gulf of Thailand.

New or little explored aspects of fishery research.

General papers on marine biology and fisheries.

General papers on freshwater biology and fisheries.

The improvement and management of natural inland waters and impounded waters.

In a circular letter addressed to various fisheries scientists in the Pacific area, Dr. A.L. Tester of the Pacific Oceanic Fishery Investigations, Hawaii, Secretary of the Standing Committee on Fisheries has particularly called attention to the symposium on "New or little explored aspects of fishery research". Dr. Tester has invited papers on the various topics of discussions and symposia. These papers and their abstracts are to be submitted by 1 August 1957 or as soon thereafter as possible.

Symposium on Measurement of Basic Marine Production

FAO, UNESCO and International Council for the Exploration of the Sea (ICES) are jointly sponsoring a symposium on the measurement of basic marine production. It is planned for two days preceeding the 45th Statutory Meeting of the ICES due from 27 September 1957 at Bergen, Norway.

A tentative programme provides for discussions on: Methods of measuring production (C_{14} methods, oxygen method, nutrient consumption); Methods of estimating standing crop (Chemical methods, counting methods, light measurement); Measurements of primary production; and, time permitting, Environmental conditions governing primary production.

International Conference on Radio Isotopes in Scientific Research

More than 1,000 scientists from all over the world are expected to attend an international conference on radio isotopes in scientific research which is being convened by UNESCO in Paris from 9-20 September 1957.

The conference will be strictly scientific in character and devoted to the presentation and discussion of scientific papers dealing with original research. It will not be empowered to adopt resolutions or make recommendations.

The proceedings of the conference, including papers and the discussions, will be published by UNESCO in due course.

1957 International Fisheries Exhibition

The International Fisheries Exhibition to be held at Lowestoft from 21-26 October 1957 will be the first of its kind in Great Britain. Representation has already been promised from firms in several overseas countries. Lowesto ftis a progressive fishing port with excellent facilities for an exhibition, both on land and on water.

The Exhibition will cover all aspects of the commercial fishing industry – shipbuilding, engines, catching, processing, packaging and distribution, and all the equipment necessary for those operations. It has been granted the backing of both the White Fish Authority and the Herring Industry Board. The Exhibition will be staged in two halls. The Pavilion will show sea-going equipment (shipbuilding, engines, navigational instruments, nets and ropes, life-saving equipment,

etc.), and at the Palais will be products normally used on land (processing machinery, freezers, refrigeration, boxes, transports, foods, etc.). In addition to the two halls, the organizers have been granted the use of the Yacht Basin which adjoins the Pavilion. Modern trawlers and other fishing craft will be open for inspection, and the basin will also be made available for firms with suitable vessels or products for demonstration.

Forthcoming Conferences, Meetings and Training Centres

August - December 1957

August	8-15	International Statistical Institute - 30th Meeting.	Stockholm
„	19-29	Economic Commission for Asia and the For East (ECAFE) - Working Party on Inland Ports.	Bangkok
„	28-Sept. 3	International Congress on Cell Biology - 9th Congress.	St. Andrew's, Scotland
„	–	Organization of American States (OAS) - Inter-American Economic Conference.	Buenos Aires
September	1-3	Economic Commission for Europe (ECE) - Working Party on the Standardization of Fish.	Geneva
„	1-5	International Union for the Conservation of Nature (IUCN) - General Assembly.	Athens
„	3-6	American Society of Limnology and Oceanography - Special Meeting.	Woods Hole, Mass., USA
„	3-14	International Union of Geodesy and Geophysics - 11th General Assembly.	Toronto
„	7-10	Netherlands Ship Model Basin at Wageningen - Symposium on the Behaviour of Ship in a Seaway.	Wageningen, Netherlands
„	9-20	United Nations Educational, Scientific and Cultural Organization (UNESCO) - International Conference on Radio Isotopes in Scientific Research.	Paris
„	11-13	American Fisheries Society - 87th Annual Meeting.	Las Vegas, USA

September	13-23	International Towing Tank Conference - 8th Conference.	Madrid
,,	23-27	International Society of Bioclimatology and Biometerology - 1st Congress.	Vienna
,,	26-27	Meeting of Consultants on International Oceanographic Expeditions and Research Vessels.	Bergen
,,	27-Oct. 6	International Fisheries Trade Fair - 2nd Fair.	Copenhagen
,,	27	Symposium on Measurement of Primary Production in the Sea (joint ICES/UNESCO/FAO).	Bergen
,,	30-Oct. 8	International Council for the Exploration of the Sea (ICES) - 45th Meeting.	Bergen
October	7-12	Food and Agriculture Organization of the United Nations (FAO) - International Fishing Gear Congress.	Hamburg
,,	8-11	Economic Commission for Europe (ECE) - Working Party on the Standardization of Perishable Foodstuffs.	Geneva
,,	21-25	Committee on Commodity Problems (CCP) - 29th Session.	Rome
,,	21	Commission for Technical Co-operation in Africa, South of the Sahara (CCTA) - Inter-African Statistics Conference.	Laurenco Marques
,,	21-26	International Fisheries Exhibition.	Lowestoft, UK
,,	22	Permanent Commission of the International Fisheries Convention (1946) - 6th Meeting.	London
,,	25-Nov. 5	Pan-Indian Ocean Science Congress - 3rd Congress.	Tananarive, Madagascar
,,	28	World Meteorological Organization (WMO) - Seminar on Hydrological Forecasting and the Water Balance in the Mediterranean and South-West Asia Areas.	Belgrade
,,	28-31	Food and Agriculture Organization of the United Nations (FAO) Council - 27th Session.	Rome
November	2-22	Food and Agriculture Organization of the United Nations (FAO) Conference - 9th Session.	Rome

November	4-9	Experimental Centre of Refrigeration - 2nd General Assembly.	Vigo, Spain
,,	5-8	International Permanent Committee on Canned Foods (CIPC) - 1957 Meeting.	Paris
,,	9	Inter-Agency Working Group on Water Development.	New York
,,	11-15	Gulf and Caribbean Fisheries Institute - 10th Annual Meeting.	Miami Beach, USA
,,	12-13	United Nations Educational, Scientific and Cultural Organization (UNESCO) - Meeting of Representatives of Marine Science Institutes in the Indo-Pacific Region.	Bangkok
,,	15, 16, 18	United Nations Educational, Scientific and Cultural Organization (UNESCO) - International Advisory Committee on Marine Sciences - 2nd Meeting.	Bangkok
,,	18-Dec. 9	Pacific Science Association - 9th Congress.	Bangkok
,,	20-27	Commission for Technical Co-operation in Africa, South of the Sahara (CCTA) - Symposium on Oceanography and Sea Fisheries on the West Coast of Africa.	Launda, Angola
,,	–	United Nations Educational, Scientific and Cultural Organization (UNESCO) - International Symposium on the Migrations of Fishes, Caribbean Fisheries Seminar - 3rd Seminar.	Havana
,,	–	Inter-American Statistical Institute (IASI) - Committee on Improvement of National Statistics - 4th Session.	–

FAO TRAINING CENTRES

October 21-Dec. 14	Latin American Fish Processing Training Centre.	Lima
December 16-Jan. 25	Training Centre on Fishery Co-operatives and Administration for the Indo-Pacific Region.	Sydney and Adelaide

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